TROPICAL DISEASES BULLETIN

IMPERIAL MYCOLOGICAL INSTITUTE 3 NOV 1944

VOL. 41.] 1944. [No. 9.

MAIN CONTENTS:

	PAGES
Medical Organization and Diseases of the Andaman and Nicobar Islands	703–708
Summary of Recent Abstracts VII.—Helminthiasis (*concluded*)	709–717
Malaria	718–733
Blackwater Fever	733
Trypanosomiasis	733–735
Leishmaniasis	736–737
Fevers of the Typhus Group	738–746
Bartonellosis	746
Yellow Fever	747–751
Dengue	751–753
Plague	753–754
Bacillary Dysentery	754–757
Amoebiasis and Intestinal Protozoal Infections	757–758
Relapsing Fever	758–759
Leprosy	760
Helminthiasis	760–773
Deficiency Diseases	773
Venoms and Antivenenes	773–774
Dermatology and Fungous Diseases	774
Miscellaneous	775–787
Book Reviews	787–790

For detailed Contents see pp. ii, iv, vi and vii.

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.
(Telephone: MUSEUM 3041)

[Price 2/6 Net. *Entered as Second Class Matter in the U.S.A. Post.* Annual Subscription 21/-

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES.

Chairman: A. G. H. Smart, *C.M.G.*, *M.B.E.*, M.D., D.P.H., D.T.M. & H.
(*Chief Medical Adviser to the Secretary of State for the Colonies*).

Wm. Horner Andrews, D.Sc., M.R.C.V.S.

Major-General Sir Ernest W. C. Bradfield, *K.C.I.E.*, I.M.S. (retd.).

Sir Wilson Jameson, *K.C.B.*, LL.D., M.D., F.R.C.P. (*representing the Ministry of Health*).

Professor Patrick A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S.
(*representing the Royal Society*).

Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Sir Edward Mellanby, *K.C.B.*, M.D., F.R.C.P., F.R.S., K.H.P.
(*representing the Medical Research Council*).

E. R. A. Merewether, M.D., M.R.C.P., F.R.S.E., K.H.P.

Brigadier G. S. Parkinson, *D.S.O.*, M.R.C.S., L.R.C.P., D.P.H., R.A.M.C.

J. B. Sidebotham (*of the Colonial Office*).

Secretary: C. A. Grossmith, *of the Colonial Office*.

STAFF OF THE BUREAU:

Acting Director: Charles Wilcocks, M.D., M.R.C.P., D.T.M. & H.

Acting Assistant Director: J. F. Corson, *O.B.E.*, M.D., D.P.H., D.T.M. & H.

Secretary: R. L. Sheppard.

LIST OF ABSTRACTERS IN THIS ISSUE.

T. Bedford, D.Sc., Ph.D.

Professor S. P. Bedson, M.D., F.R.S.

J. R. Busvine, Ph.D., B.Sc.

Professor P. A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S. (*Sectional Editor*).

C. C. Chesterman, *O.B.E.*, M.D., M.R.C.P., D.T.M. & H.

J. F. Corson, *O.B.E.*, M.D., D.P.H., D.T.M. & H.

Robert Cruickshank, M.D., M.R.C.P., D.P.H.

W. A. L. David, B.A.

J. T. Duncan, F.R.C.S., L.R.C.P. (Ire.), D.T.M. & H.

Professor L. P. Garrod, M.D., F.R.C.P.

Lt. Col. W. F. Harvey, *C.I.E.*, M.B., F.R.C.P.E., D.P.H., I.M.S. (retd.) (*Sectional Editor*).

F. Hawking, D.M., D.T.M.

Professor Edward Hindle, M.A., Sc.D., Ph.D., F.R.S. (*Sectional Editor*).

G. Lapage, M.D., M.Sc.

F. O. MacCallum, B.Sc., M.D.

Maj.-Gen. Sir John W. D. Megaw, *K.C.I.E.*, D.Sc., M.B., B.Ch., I.M.S. (retd.) (*Sectional Editor*).

Sir H. Harold Scott, *K.C.M.G.*, M.D., F.R.C.P., D.P.H., D.T.M. & H.

R. L. Sheppard.

H. S. Stannus, Ph.D., M.D., F.R.C.P., D.T.M. & H. (*Sectional Editor*).

H. W. Swann, M.B., B.S.

J. Waterlow, Ph.D.

C. M. Wenyon, *C.M.G.*, *C.B.E.*, M.B., B.S., B.Sc., F.R.S. (*Sectional Editor*).

F. Norman White, *C.I.E.*, M.D., D.P.H., I.M.S. (retd.) (*Sectional Editor*).

Charles Wilcocks, M.D., M.R.C.P., D.T.M. & H.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 41.] 1944. [No. 9.

MEDICAL ORGANIZATION AND DISEASES OF THE ANDAMAN AND NICOBAR ISLANDS

BEFORE THE JAPANESE INVASION

By Charles Wilcocks, M.D., M.R.C.P., D.T.M. & H.,

Acting Director, Bureau of Hygiene and Tropical Diseases.

Health Services.

The medical staff of the Andamans consists of one senior medical officer, a medical officer for the North Andamans, a lady assistant surgeon, several sub-assistant surgeons (one born locally), one European nurse, and subordinate staff. There are 10 hospitals, as follows :—

Hospital	*Beds*	
Ross European General ...	20	with X-ray and laboratory
Ross Indian General ...	30	
Ross Convict	50	
Haddo	300	with laboratory
Bamboo Flat...	25	takes tuberculosis, leprosy and infectious diseases
Dundas Point	25–40	
Tusonabad	25	
North Andaman	25	Bonington Hospital, chiefly for Forestry Department
Cellular Jail	50	
Atalanta Point	—	for women and children

Bacteriological examination of water and other material can be carried out at the Haddo laboratory.

In addition to these hospitals there are dispensaries at Garacherama, Homfrayganj, Maymyo, Ferrarganj, Port Mouat, Lowisabad (temporary, for labourers on dredging work), Phoenix Bay (marine workshop) and at the forest camps on Long Island (Middle Andaman) and Manglutan (travelling). Most of the fixed dispensaries have 5 to 10 beds each. The dispensaries are in the charge of convict or ex-convict compounders trained at Port Blair. These men often return to this work when set free after serving their period of detention.

A motor ambulance is available to the medical department.

In the Nicobars there is a mission hospital at Mus Car Nicobar, which is State-aided and at which about 9,000 cases are treated each year, and a Government hospital under the care of a sub-assistant surgeon at Nankauri.

The general sanitary conditions of the people of these islands are poor. The inhabitants have no understanding of the importance of proper disposal of excreta and refuse, but the convict settlement is in a better state, and in recent years some latrines have been installed in the villages. These are as yet few, but their use will extend. At Ross and Aberdeen nightsoil is dumped into the sea ; the drainage at these places has recently been improved. Head lice and body lice are to be found on the people.

Water supply is drawn largely from shallow wells or streams, but rainwater tanks are not uncommon. There are protected reservoirs at Hope Town, Bamboo Flat and Lamba Lines village ; water is taken to Ross Island in water boats. At Bonington the supply is not good, the tanks are liable to surface pollution, and the water from a tube well was found to be unsatisfactory. Various samples of water have been sent from the Andamans to Rangoon for testing, and only on one occasion was the sample passed for purity. All water should therefore be boiled or otherwise sterilized before use, unless vouched for by the medical authorities.

Insect-borne Diseases.

Malaria.—The malaria of the Andamans is peculiar in that it is transmitted, so far as is known, by only one species of mosquito, *Anopheles sundaicus* (the *A. ludlowi* of several authors) which, since it breeds in water which has a high content of salt (though not in actual sea water) has a restricted distribution in the neighbourhood of salt swamps. The water cut off from the sea by the artificial bunds constructed in the harbour area of Port Blair, which is diluted with rain water, forms an ideal breeding medium for this mosquito. The rainfall is most abundant in the period May to September, and at this time, therefore, there is the greatest amount of diluted salt water, mosquitoes are most prevalent, and malaria most intense. At this time also the warm weather is most favourable to rapid breeding. The disease becomes epidemic in convicts employed in reclamation and bunding work during the monsoon.

Malaria is therefore common in the villages around the salt swamps ; in villages more than half mile from these swamps the disease is comparatively rare. The malarious villages of Port Blair are :— Kadakachang, Bumlitan, Dhani Khari, Chauldari, Sipighat, Taylerabad, Nawashahr, Stewartganj, Homfrayganj, Mitha Khari, Bamboo Flat, Knappuram, Herbertabad, New Nawashahr, Muslim Basti, Mallapuram, Manpur, Mannarghat, Hashmatabad, Calicut, Marthura and Forest Village. Viper Island is a most malarious spot. In the first seven of these malaria is particularly severe, and the proportion of children having enlarged spleens at times reaches 100 per cent. This heavy incidence causes many deaths in infancy, predisposes the inhabitants to other diseases, and adversely affects the birth rate by diminishing the number of conceptions and increasing the number of abortions.

Malaria is much less prevalent in villages situated away from the salt swamps, and therefore out of effective range of *A. sundaicus*, in spite

of the fact that round these villages there are rice fields and fresh water swamps in which a number of other species of *Anopheles* breed. The spleen rate in children averages about 5 per cent., in adults about 24, but this relatively high adult rate is probably due to the fact that many of the men have spent much of their lives elsewhere, and have contracted malaria in other parts, either out of the Andamans, or in the convict stations.

Malaria is not confined to the Port Blair area. The Burmans of the villages of Long Island suffer severely, as do the natives in Passage Island; in both of these islands there are salt swamps. *Anopheles sundaicus* is also found in North Andaman and Middle Andaman, in Henry Lawrence Island and Sound Island. In all these there is malaria, especially in employees of the Forestry Department. In Karen villages malaria was severe in a group of relatively non-immune Burmans who arrived there shortly before 1927. Ross Island is reputed to be free from the disease.

In natives long exposed to malaria infection a considerable immunity is developed by the time adult life is reached, and it is noted that the "self supporters" living in Chauldari, a quarter of a mile from a very malarious convict camp, were themselves largely immune.

The *Anopheles* mosquitoes found in the Andamans are as follows:— *A. sundaicus*, the vector of malaria, which breeds in salt swamps, behind defective bunds, near defective sluice gates. The ideal breeding place is a pool reached by the spring tides but not by the daily tides, which thus has a quiet period during which the larvae can hatch out undisturbed. Some larvae have been found in fresh water pools where the salt pools have been destroyed. The larvae are probably reduced in numbers by fish such as *Panchax panchax* or *Haplochilus melanostigma*, which are found there. *A. sundaicus* may fly as much as three miles, but the maximum biting activity takes place at a shorter distance than this; this mosquito readily attacks man.

Though the most dangerous mosquito however, *A. sundaicus* is not the commonest *Anopheles*. *A. vagus* is much commoner, breeding in various temporary collections of water and in rice fields. *A. tesselatus* is found occasionally in pools, often with *A. leucosphyrus*, which has also been found in a disused well. *A. barbirostris* breeds in slow streams, tanks covered with weeds, and wells, *A. philippinensis* in rice fields and weedy tanks, *A. aitkeni* in forest pools. A few specimens of *A. aconitus* and *A. umbrosus* have been found.

These mosquitoes (other than *A. sundaicus*) have not been found to carry malaria in the Andamans, but some of them are known vectors elsewhere, though of poor efficiency, and it is not possible to say that they cannot play a part in transmission in the future.

No information concerning the *Anopheles* of the Nicobars is available, but it is probable that *A. sundaicus* is responsible for malaria there, as it is elsewhere in the islands off the Malay peninsula.

The type of malaria commonly found varies with the season of the year. In one report subtertian accounted for 59 per cent. of the cases, benign tertian for 11 per cent., quartan for 35 per cent., but it is noted that subtertian is higher in children than in adults and that it increases when transmission is active and anophelines are prevalent, *i.e.* from May to September. Other reports give higher figures for benign tertian (especially in children) and much lower for quartan. The reason for the relatively high incidence of quartan found by two independent observers is not clear. It is present in acute cases as

well as in relapses, though probably more common in convicts than in children. The vector is the same as that of the other species of parasite.

As a result of control measures taken in recent years, which have included the removal of villages originally close to the dangerous salt marshes, the amount of malaria has shown a definite decline, but it is noted that in 1927 it was still the principal cause of illness, and was responsible, about that time, for 7 to 15 per cent. of deaths from all causes. In 1921, 50 per cent. of prisoners were treated for malaria; in 1940 the figure had fallen to 16 per cent.

The antimalarial measures are carried out by a special gang, and consist chiefly of reclamation of swamps. Suppressive drugs are given to the prisoners in the transmission season, and treatment of attacks is thoroughly carried out. It is worth noting that a fairly high incidence of malaria occurred in 1930–31 when harbour reclamation work was being undertaken; in connexion with military operations, harbour work may give rise to considerable outbreaks, especially in Europeans, who have little or no immunity.

From the Nicobar Islands there is little detailed information, but it is known that malaria is prevalent. It is probably conveyed in the same way as in the Andamans, and especially in the rainy season from May to September, but there is no definite information available as to its distribution. It would, however, be wise to expect it in the neighbourhood of salt marshes.

Blackwater fever is occasionally seen in the Andamans.

Sandfly fever is known in the Andamans, but kala azar and oriental sore—also transmitted by *Phlebotomus* in other countries—have not been reported.

[See also filariasis, below.]

Intestinal Diseases.

It has been noted above that the water supplies of the Andamans are usually polluted, and this is no doubt also true of the Nicobars. It is to be expected, therefore, that water-borne disease should occur. Further, in view of the lack of sanitary sense in the village natives, and of the inadequate number and use of latrines, it is to be expected that intestinal diseases, caused by the fouling of food or water by human excreta, should be prevalent.

Bacillary dysentery and *diarrhoea* are common, especially during the rainy season and in newly arrived persons. These diseases are probably conveyed more by flies and by contamination of food through direct handling by infected persons than by contamination of water. They take a heavy toll of infant life. *Amoebiasis* is reported to be common, but liver abscess is rare. Dysentery is also well known in the Nicobars.

Fevers of the *typhoid* group occur sporadically in the Andamans, and small outbreaks have been reported, for instance, one near the Aberdeen bazaar in 1934–35.

It has been noted in several reports that *cholera* has not been found. Neither typhoid nor cholera is mentioned in the Nicobars.

Sprue is relatively common in convicts and self-supporters in the Andamans and is believed to be increasing. In these cases there is often a history of amoebic dysentery, but there is a suggestion that dietetic factors may play a part in causation.

Helminthic Infections.

Hookworm infection is common throughout the Far East, and in the Andamans it is found in about 25 per cent. of the police force, and no

doubt in a greater proportion of the general population. In 1939 a survey was made which revealed more cases than had previously been known. It is said that fresh infections are constantly introduced into the police force by recruits from India and by men returning from leave.

Filariasis is common in India, Malaya and the Nicobars, yet it is not known in the Andamans. Embryos were found in the blood of one prisoner from India, and this man was sent away from the Andamans so that he should not infect the local mosquitoes and so originate the disease in the islanders. In the Nicobars the position is very different, elephantiasis is common and one observer found 35 cases in a population of 600 ; the incidence of filariasis (that is, of embryos in the blood, not necessarily accompanied by elephantiasis) must be much greater. Information on the species of filaria responsible for the condition in the Nicobars has not been seen, but it is probably *Wuchereria bancrofti*, transmitted by *Culex fatigans* and other mosquitoes.

Other Diseases.

Leptospirosis (*Weil's disease*).—This disease, which occurs sporadically in many parts of the world, is unusually prevalent in the Andamans, though there is no report of its occurrence in the Nicobars. It is caused by a leptospira which in other countries is a parasite of rats. In the Andamans, though the rats examined have been negative, it is probable that some such reservoir of the disease exists. The infection in man is widely scattered, cases occur in all seasons, but are most common from June to December, that is, during and after the rains. Most of the patients are adult males engaged in agricultural work in the rice fields or in bund construction, both of which occupations entail working in water for long periods. In 1938 there were 152 known cases, with 25 deaths ; in 1939, 49 cases with 11 deaths. This reduction coincided with a lowered rainfall in the latter year. Cases have been found throughout the Port Blair settlement, inland as well as along the sea coast. The soil and water may be contaminated by man or rodents, since the urine of both contains the organisms during the course of the disease and, intermittently, for 44 days at least during convalescence in some cases.

In the Andamans the disease, which has been recognized since 1892, is often mild, but severe cases may occur, and the case mortality is about 18·7 per cent. There is fever, and the outstanding symptoms are severe muscular pains, prostration, haemorrhages from mucous membranes, jaundice (in two-thirds of the cases) and albuminuria. The milder cases, with pain but without jaundice, may be mistaken for dengue. Leptospirosis may occur together with malaria, and in the malarious districts the finding of malaria parasites in the blood is not enough to exclude the diagnosis of leptospirosis if the symptoms suggest that disease and especially if the fever does not respond to anti-malarial treatment. Diagnosis is best made by means of blood culture, in suitable media, during the first six days of fever, but agglutination tests are possible at a later stage.

For treatment a serum has been prepared against the local strains and has given signs of usefulness. In prevention a vaccine has been employed and is probably of some value. The question of disinfection of soil and water has been considered, and the use of calcium cyanamide has been advised ; it is evident, however, that the use of this on a large scale presents difficulties.

Yaws is common in the Nicobars, but there is no record of it in the Andamans ; it is said that in the island of Teressa, where the incidence is very high, the fertility of the people is low, but as yaws is not transmitted hereditarily, this association may be due to other causes. *Syphilis* is known in the Andamans and probably in the Nicobars. *Gonorrhoea* occurs in both groups of islands.

Of the *infectious diseases* there are records of small outbreaks of *smallpox* in the Andamans and Nicobars, on each occasion due to the introduction of infected persons from India or from Burma. These outbreaks were soon controlled. *Chickenpox, measles* and *mumps* occur, sometimes in epidemic form. There have been epidemics of *influenza* with high mortality, for instance in the Nicobars in 1939–40, when *pneumonia* was common. The latter disease is a common cause of death, not necessarily in epidemic form, in the Andamans. *Bronchitis* is common, and in the Andamans *asthma* is exceptionally prevalent ; the moist atmosphere has been blamed for this. It is noted that *tuberculosis* occurs in the Andamans. This usually affects the lungs and is a very fatal disease in these natives.

Tropical ulcer is reported, but not in great amount.

In 1921 there was in the Andamans an outbreak of *dropsy* among the free Ranchi coolies in one camp. With this dropsical condition there were disturbances of the digestive system, and spongy, bleeding, gums were common. The cause of the outbreak was obscure, there were points against diagnoses of scurvy, beriberi and epidemic dropsy. In 1936 a few cases of epidemic dropsy were recorded, and were ascribed to the eating of old rice. It is now known that this condition is connected with mustard oil, or some contaminant of mustard oil, but beriberi is associated with a rice diet, and has been ascribed in Burma to the consumption of mildewed rice ; this being so, it is possible that this outbreak may have been a form of beriberi. Other food deficiency diseases are not recorded.

The *diet* of the people is apparently fairly satisfactory ; the convicts are well fed, having plentiful supplies of fish and vegetables. Among the islanders ata, rice and dal are staple articles of diet. A dairy farm supplies milk. In the Nicobars pigs are kept, and cattle are fairly numerous. Coconuts are cultivated and largely eaten. Fish is common.

There is considerable smuggling of *opium* into the Nicobars, and addiction is reported.

References.

Annual Reports of the Public Health Commissioner with the Government of India. Various years.

Bayley de Castro, A. *Indian Med. Gaz.* 1922, Vol. 57, p. 132.

Census of India, 1931. Vol. 2. The Andaman and Nicobar Islands. Calcutta. 1932.

Christophers, S. R. 1912. Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India. New Series No. 56.

Covell, G. 1927. Report of an Inquiry into Malarial Conditions in the Andamans. Delhi, 1927.

Covell, G. & Baily, J. D. *Indian J. Med. Res.* 1927–28, Vol. 15, p. 309.

d'Souza, A. J. Census of India, 1931. Vol. 2. Appendix C.

Report of the Administration of the Andaman and Nicobar Islands and Penal Settlement of Port Blair for various years, 1929–1940.

Taylor, J. & Goyle, A. N. 1931. *Indian Med. Res. Mem. No. 20.*

SUMMARY OF RECENT ABSTRACTS.*

VII. HELMINTHIASIS.

[*Continued from* p. 636.]

Hookworm Infection.

Hookworm infection is widespread in the Szechwan Province of China, and CHANG *et al.* (p. 851) have attempted to relate the incidence to the kinds of agriculture practised in the various areas. There appears to be no relation to mulberry cultivation or rice cultivation, and the production of sugar cane and citrus trees does not seem to be important in this respect. In general, " dry land cultivation " of miscellaneous crops in the hilly sections of the province probably produces conditions favourable for hookworm propagation, and there is a specific association between sweet-corn potato cultivation and hookworm disease, which has not hitherto been recognized.

NICKEL (p. 70) reports on a survey of amoebiasis and hookworm infection in the State of Mississippi. Of 49,170 specimens from all parts of the State, 24·3 per cent. were positive. Two previous surveys had been made in 1910 and 1932–33, and the results are compared; the techniques in the three surveys were different, but not sufficiently so to invalidate some comparison. There was a considerable reduction in the number of infections between the first two surveys, but since then there has been an increase, though the severity of the infections has fallen.

HILL and ANDREWS (p. 324) have studied the relationship between hookworm burden and physical status in white persons in Georgia, U.S.A. In general, a decrease of haemoglobin accompanies an increase of hookworm infection, but there are wide differences in individual reactions; in Mississippi particularly the haemoglobin decreases rapidly with light infections. These differences are probably due to anaemia caused by agents other than the hookworm, probably constitutional or nutritional factors. It is noted that three-quarters of the patients with signs of cardiac abnormality showed signs of nutritional complications, and that diets in the rural areas are deficient in animal protein, iron and vitamins. The authors found that, without iron therapy, recovery is slow after removal of the worms; the drug they use is tetrachlorethylene, and iron is given in the form of Blaud's pill.

HEILIG (p. 68) has studied the effects of hookworm disease on the heart. He points out the importance and difficulty of distinguishing between decompensated mitral disease with failure of the right heart, and the cardiac lesions induced by hookworm infestation, because the fate of the patient may depend upon the treatment given. The deciding factors in this differentiation are set out. In his investigations he found that in the great majority of cases the cardiac condition improves in proportion as the blood count and haemoglobin percentage improve after administration of an anthelmintic and subsequent iron treatment,

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1943, v. 40. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

but in some of his cases, in which the drugs had failed to clear out all the worms, the condition did not disappear, although improvement in the blood count and haemoglobin was marked. After other doses of anthelmintic had been given, however, and the worms expelled, the cardiac disabilities soon disappeared. Heilig argues that these experiences provide evidence in favour of the view that there is a toxic element in hookworm disease as it affects the heart; the nature of the toxin, however, is not known. In severe cases it is his practice to give a course of Blaud's pill before administering the anthelmintic.

YENIKOMSHIAN and SHEHADI (p. 614) report on patients with clinical histories suggestive of duodenal ulcer, and with ova of *Ancylostoma duodenale* in the faeces. Free acidity was estimated, and showed a rise higher than that obtained in duodenal ulcer, and the high levels were maintained in spite of varying degrees of severe anaemia. X-ray showed various abnormalities of the duodenum, but these were rapidly eliminated, and epigastric pain was relieved, after an anthelmintic was given.

BONNE (p. 325) describes five cases in which *Ancylostoma duodenale* was found in haemorrhagic areas of the intestinal wall of man, having invaded the tissues. The patients were Malays and a Chinese, in Java, where infection with this worm is not common. Similar invasion in man had previously been found due to *A. braziliense*, but *Necator americanus*, the commonest hookworm of Java, does not, apparently, invade the tissues. The reason for this may be the absence of teeth from its buccal capsule.

MUKERJI and MAPLESTONE (p. 707) have tested numerous methods of preserving hookworm eggs in faeces. Most were unsatisfactory, but it was found that by diluting the faeces 1 in 30 in 1 per cent. NaCl solution, the eggs could be preserved in good condition for about one month. They therefore suggest that 3 cc. of faeces should be collected in a paper container, and dropped into a bottle containing 87 cc. of 1 per cent. NaCl, which is then corked and sent to the laboratory for counting. There is no loss of eggs in this procedure.

WILKINS (p. 67) describes a simple glycerin-salt technique for counting hookworm eggs, for the details of which the original abstract should be consulted. He claims that the method is accurate enough for clinical purposes. In treatment he uses the following mixture: 2 cc. carbon tetrachloride, 1 cc. oil of chenopodium, 15 gm. magnesium sulphate, water to 30 cc. Of this, 1 cc. is given for each 4 lb. body weight.

ANDREWS (p. 615) discusses the anthelmintics used in the treatment of hookworm infections, and concludes that carbon tetrachloride and oil of chenopodium, though very effective, have toxic effects which render their use undesirable. He advocates tetrachlorethylene, two doses of which are therapeutically equivalent to, and much safer than, one dose of carbon tetrachloride. If *Ascaris* also is present, he advocates hexyl resorcinol followed by tetrachlorethylene. In control the policy should be to detect and prevent hookworm disease (in which blood loss exceeds replacement) rather than to eradicate subclinical infections. The family should be the unit for investigation, and attention should be paid to the nutritional side of the problem; it has been shown that in dogs immunity can be developed against the dog hookworm, but that this can be broken down by dietary deficiencies.

HEILIG and VISWESWAR (p. 400) have investigated the influence of anti-anaemic treatment (*viz.* administration of 90 grains of Blaud's

pill each day) on gastric function in hookworm disease. A relatively high proportion of the series of patients showed achlorhydria or hypochlorhydria, but although the anti-anaemic treatment was successful in improving very greatly the condition of the blood, it was found to have no effect on gastric secretion, and exerted its effect independently of the gastric acidity. [Compare Yenikomshian and Shehadi, above.]

Andrews and Webb (p. 158) have investigated, in dogs, the effect of moderate hookworm infection on the absorption of quinine from the intestinal tract, since it has been thought that, in human malaria, the lack of response of some cases to quinine may be due to coincident hookworm infection. They found that moderate infestation has little or no effect on the maximum blood concentration of quinine, or on the time elapsing between administration of the dose and the attainment of that maximum.

Sheldon and Groover (p. 321) show that round the oral, genital and anal openings of infective larvae of *Necator americanus*, incubated in serum from infected children, there form fine granular deposits similar to those which have been found in comparable experiments with *Ancylostoma caninum*. Not all sera from infected children produced this effect, however, and with the sera of heavily infected children no deposit was formed. The deposit was not given with sera from normal children. The precipitins which cause this effect do not, *in vitro*, hinder the activity of the larvae, but it is possible that *in vivo* they may immobilize or otherwise interfere with the larvae, or inhibit their enzymes. The inconstancy of their appearance indicates that the precipitins may not be specific.

Ascaris Infection.

In the plain of Kasenyi, near Lake Albert, Scops (p. 250) notes that the commonest helminth infection is schistosomiasis. *Ascaris* infection is next, but ankylostomiasis is very rare.

Račić (p. 792) refers to the X-ray appearances in heavy *Ascaris* infection, and to the fact that the worms are often arranged in bundles, parallel with each other. This condition is not so dangerous as when they are tangled together into a ball, which may cause intestinal obstruction.

In view of the proposal to use sewage for manuring vegetable gardens on the outskirts of towns in Russia, Vassilkova (p. 318) has investigated the helminth egg content of sewage. He found 19 ova per litre, several species being represented; contamination of the vegetables was also found, but the only viable ova recovered were those of *Ascaris*. He suggests that sewage may be used for this purpose if it is allowed to stand for two hours in special ponds, when most of the ova will have sedimented out, or if the vegetable beds are infiltrated through trenches. Vegetables to be consumed raw must not be laid on the ground after collection.

The same author (p. 318) has found that in open pit latrines *Ascaris* eggs were all dead after having been left for six months. In pit latrines covered with boards and earth, a period of 10 to 13 months was necessary before total destruction could be achieved, but if the faeces were covered in early spring a period of eight months was enough, since destruction is more rapid in summer. In faeces diluted with equal volume of water, only 95·5 per cent. of eggs were dead in

20 months ; diluted faeces, therefore, should not be used for manuring vegetables and berries consumed raw.

Schill (p. 790) has investigated the *in vitro* action of certain anthelmintics on Ascarids from the pig. The known anthelmintics are active in water, but in intestinal contents they are either inactive, or active only after a long time. The action of santonin was transient, and in most of the experiments, therefore, oil of chenopodium was used. Its action is delayed by intestinal contents, but addition of alcohol and chloroform or paraldehyde increases its activity both in water and in intestinal contents. The mucus which surrounds the worms in the body may have an effect in protecting it against the drug, and the capsules in which the drug is contained may not dissolve quickly enough. The author therefore suggests that a duodenal tube be passed, the intestine be emptied and its mucus dissolved by washing out with a solution of sodium bicarbonate, and that 100 cc. of water containing 0·06 gm. oil of chenopodium, 0·5 gm. paraldehyde, 15 gm. aqua chloroformi and 5 cc. absolute alcohol be passed through. This may be repeated in half an hour to attack worms not affected by the first dose. A quarter of an hour later a saline purge should be given. [It is not stated if this method has actually been tried in man.]

Filariasis.

Hawking (p. 616) has reviewed the literature of filarioid infections in East Africa.

Having found microfilariae in the blood of 40 per cent. of a small group of soldiers from Uganda, examined while on service in Palestine, Fine and Livny (p. 926) suggest that infected recruits should not be sent out of the areas in which they were recruited, lest they infect the local arthropod vectors. Most of the parasites were not identified.

Galliard (p. 71) reports observations on the emergence of larvae of *Wuchereria bancrofti* from the proboscis of *Culex fatigans*.

Rutishauser (p. 72) describes an operation for elephantiasis of the scrotum, of which details are given in the original abstract.

Rao (p. 160) reports on a focus of filariasis in Lower Assam, where the infection was principally due to *Wuchereria malayi*. The general nocturnal microfilarial rate was 4·7 per cent., but in one village was as high as 28·2 per cent. Clinical signs of the disease were found in 4·5 per cent. Comparison with earlier surveys indicates that there has been no increase in the infection rate, but that there are more cases of clinical disease. Villages in swampy areas showed high incidence, and several species of *Mansonioides* were found, breeding in association with *Pistia stratiotes* and with "Dol" grass (*Sacciolepsis interrupta*). Villages in extensively cultivated districts were practically free. In only one village was *Culex fatigans* found, and there the infection was with *W. bancrofti*.

Hu (p. 254) states that *Culex fuscanus* is susceptible to infection with *W. malayi*, but probably does not play a significant rôle in transmission, in the Yangtze region, because it seldom enters houses or feeds on man.

van den Berghe (p. 162) has published the results of his extensive investigations on the problem of onchocerciasis in the Belgian Congo. He points out that transmission by *Simulium* has never been conclusively proved, but agrees with Blacklock that "in so far as experiments with wild flies can be accepted as evidence, in the absence of actual transmission to man and animals, *S. damnosum* is a vector of

O. volvulus." *S. damnosum* is found most frequently near rapid streams, but after rain may be seen as far as 500 metres from a river. It bites more especially in the morning, but also in the evening, and tends to bite low, close to the ground. The author has demonstrated, for the first time, the presence of adult female *O. volvulus*, in full reproductive activity, *outside* the nodules. He found, in one group of people, an excess of those with dermal microfilariae over those with nodules, and thinks it probable that the presence of microfilariae in persons free from nodules can be attributed to these extra-nodular adult female worms. Five categories of nodules are recognized: (1) Those with eggs liberated by damage of the contained female by the needle, (2) Those with few larvae and no eggs, (3) Those with greenish, syrupy or caseous pus, without eggs or larvae, (4) Cold abscess, full of pus, and sometimes cuticular remains of worms, (5) Fibrosed nodules without eggs, larvae or pus. The author discusses some of the little-known general manifestations of onchocerciasis. Eosinophilia varies from 15 to 35 per cent. Cutaneous manifestations are difficult to associate with the infection—they are never pathognomonic. The ocular manifestations are less controversial in patients with cranial nodules and with microfilariae in the conjunctiva. The connexion of affections of the lymphatic glands with onchocerciasis is not definitely established; these affections, and elephantiasis, are often due to causes other than onchocerciasis. In treatment, surgical removal of nodules is better than the injection into them of substances designed to kill the worms. Prophylaxis is impossible—Simuliidae cannot be eradicated, there is an enormous reservoir of infection in man, buffalo and antelope; clothes are man's only means of partial protection.

Rodhain (p. 167) agrees with van den Berghe in holding that there is lack of experimental proof of the relation between *O. volvulus* and glandular enlargement, but quotes a case in which microfilariae of the *Onchocerca* type were found in enlarged inguinal and para-axillary glands, and in which no other cause of enlargement could be found.

Barlovatz (p. 327) describes inflammatory reactions which may occur in or around the nodules of onchocerciasis. These may be due to transient congestion without other factors, in which case pain and fever are eliminated by excision, or there may be another, concomitant, cause of fever, which will not be removed by excision. He cites cases in which inflammation of nodules preceded the development of typhus or typhoid.

Schwetz (p. 213) notes that filarial infection is frequent along the lower reaches of the Lomami River in the Belgian Congo. *Acanthocheilonema perstans* is much more common than *Loa loa*. *O. volvulus* is confined to members of one tribe, in a district where *Simulium damnosum* is found.

Young and Gordon (p. 73) report a case of onchocerciasis probably contracted in the Northern Territory Province of the Gold Coast, where *Simulium damnosum* has recently been found.

Dampf (p. 255) discusses onchocerciasis as an international problem connected with the construction of the Pan-American Highway, which passes through two foci of the disease. Spread will take place along that Highway unless precautions are taken, but the author is optimistic, and thinks that Mexico and Guatemala can be cleared of the infection. He suggests that, in the dry weather, streams may be freed from Simuliidae by treatment with creolin; in the dry season,

when the number of streams is insignificant, whole areas could be sterilized at little cost.

Torres Estrada (p. 709) contributes an important note on the detection of microfilariae in the eyes of patients with onchocerciasis. He finds that they can best be seen by means of the electric direct-image ophthalmoscope, using a +20 to +40 diopter lens. This examination is simple and can be carried out anywhere. Microfilariae seem to be more abundant in the vitreous than in the anterior chamber, and may therefore be seen by ophthalmoscopy, when corneal microscopy would fail. They are negatively phototactic, being more apparent in the anterior chamber by night than by day, and more numerous at the periphery of the pupillary field than within it, during examination.

Semadeni (p. 616) describes in detail the histological appearances in the eye of a patient in whom about 300 living microfilariae of *O. volvulus* had been seen, by slit lamp microscopy, in the anterior layers of the corneal parenchyma. The microfilariae were present in practically all tissues in which there are lymphatics. He notes the value of slit lamp microscopy in diagnosis.

Enzer (p. 73), writing of the drug treatment of onchocerciasis, states that of the drugs tried, only euflavine, tryparsamide and Bayer 205 appeared to be effective, and then only if combined with protein shock (T.A.B.) therapy. Unfortunately, complete details of the courses of treatment are not given in the original article.

Meeser (p. 475) has made a preliminary study of the Simuliidae of Southern Rhodesia, where onchocerciasis is known to occur.

Vargas (p. 74) has studied the development of *Onchocerca volvulus* in Simuliidae. The details of his findings should be sought in the original abstract.

Gönnert (p. 160), having never lived in an endemic area of filariasis, was given an injection of blood from a patient in whom microfilariae, of *Loa loa* and *Acanthocheilonema perstans* were present in large numbers. The fate of these microfilariae was followed. Microfilariae of *L. loa* [and also of *W. bancrofti*] can live in the blood of a fresh, non-immune subject for four to eight days. In Gönnert the surviving microfilariae exhibited some diurnal periodicity, and it seems, therefore, that this feature is rather an attribute of the embryos and the host than due to periodic parturition of the adult female worm. Microfilariae of *A. perstans* were found for three years, though most were lost in the first few days.

In the Osmanabad District Rao (p. 256) found a general incidence of guinea worm infection amounting to 28·9 per 1,000, the heaviest being in persons aged 11 to 20. One attack apparently does not confer immunity; the author thinks, rather, that it renders the patient more susceptible. In some patients 15 to 20 worms were found. More than 80 per cent. of the population have harboured the worm at one time or another. The author details the measures he would adopt to protect the water supplies.

de Meillon and Gillespie (p. 554) describe a female nematode, closely resembling *Filaria conjunctivae*, which was removed from beneath the conjunctiva of a woman who had travelled extensively in Central Africa. Identification could not be made with certainty, but if the worm was *F. conjunctivae*, this is apparently the first record from South Africa. No microfilariae were found in day or night blood. Rossi (p. 927) reports from Italy a case of infection with

Filaria conjunctivae in which an immature female worm was found in a small tumour of the breast.

Petrov (p. 326) reports a case of infection with *Loa extraocularis* in a woman from the Caucasus. The infection was localized in the buttock.

Mazzotti (p. 476) has found a high incidence of infection with *Mansonella ozzardi* on the western watershed of the Yucatán peninsula. *Culicoides furens* is mentioned as a possible vector.

Enterobius Infection.

Cram (p. 618) sums up the findings of the American workers who have been investigating oxyuriasis since 1936. The life history of the worm is not exactly known because infection of animals is not yet possible. Embryonated eggs have been found in dust throughout infested houses, and infestation by inhalation is theoretically possible. Infection is usually familial, and prevention of spread is difficult; even strict hygienic measures may fail, and eggs cannot be killed by ordinary fumigation methods. In Washington the infection rate in white persons of all ages was 41·5 per cent., in negroes 12·9 per cent. The incidence was highest in children of school age, and the infections were not confined to crowded areas or to any social level. There is no evidence of association of infection with gastro-intestinal symptoms or appendicitis, but the worms may enter the vulva and cause a mucoid discharge, and restlessness, insomnia, feelings of shame and a sense of inferiority are common and are improved with treatment. The most successful drug is gentian violet, details of dosage of which are given; it may cause gastro-intestinal upset, but this is easily controlled. For a single dose treatment tetrachlorethylene is the best medicament.

Mazzotti and Osorio (p. 617) have compared the Graham swab and the NIH swab in the diagnosis of *E. vermicularis* infection, to the advantage of the former.

Schenken and Moss (p. 555) examined 1,000 appendices removed from patients at a hospital in New Orleans, to assess the incidence of infection with *E. vermicularis*. In white patients the incidence was 30·3 per cent., in negroes 8·4; the highest rates were in white girls (aged five to nine), 72·4 per cent., and in white boys of the same age, 66·6 per cent. Rector (p. 927) has found *E. vermicularis* in 4·76 per cent. of appendices removed from persons over the age of puberty. Kuitunen-Ekbaum and Morgan (p. 328), having examined a series of appendices from children, have failed to find any correlation between the presence of *Enterobius vermicularis* and appendicitis. Niño (p. 402), on the other hand, thinks that *Enterobius* can cause the appendicular syndrome, and quotes two cases in support of his view.

Trichiniasis.

Rappaport (p. 933) found little difference between three strains of *T. spiralis* used to infect mice, but there was considerable variation in the response of different mice to the infections. He has studied (p. 934) the longevity and sex ratio of the adult worms in the intestine, and the rapidity of larval development in the musculature. For information on these points the original should be consulted.

Weller (p. 852) has observed partial development of the larvae of *T. spiralis* in roller tube tissue cultures of chick embryo fragments in

chick plasma clot distributed evenly over the walls of a test tube to which a nutrient medium was added.

FISCHTHAL (p. 794) shows that a single small dose of larvae of *Trichinella spiralis*, given by mouth to rats, is capable of producing immunity after a period of about 14 days.

LEVIN and EVANS (p. 556) have confirmed a finding of other workers that a dose of X-ray can be so adjusted that it will allow the irradiated larvae of *T. spiralis* to develop in the intestinal phase, but will prevent the production of larvae. Development of the intestinal phase in rats, however, will induce a resistance which prevents a second infection, and the authors consider that the resistance originates in the intestine of the host rather than as a general response with production of antibodies. The authors suggest the possibility that young pigs may be fed with irradiated larvae, to prevent subsequent natural infection, so that human trichiniasis may be eradicated, but point out that the fate of the irradiated larvae in the pig would have to be studied first. STOWENS (p. 403) has investigated the effect of ultraviolet irradiation on the intestinal and muscle phases of *Trichinella spiralis*. The ability of the larvae to establish themselves in the intestine is impaired.

SPAETH (p. 478) has found the skin test, with *Trichinella* antigen, to be a valuable aid to diagnosis, more reliable than estimation of eosinophilia and the complement fixation test. In a series of definite cases of infestation, both immediate and delayed reactions were positive up to the seventh week. After the sixth week the reactions tend to become weaker, or one may be positive and the other negative. The immediate reaction appears as a red or white weal, and develops within 30 minutes ; the delayed reaction is typically the cockade form seen in the tuberculin reaction, with red centre, white weal and surrounding erythema. The delayed reaction may be visible two to three days after the injection. By means of this test symptomless cases may be detected, but it should be remembered that group reactions may be given by persons infected with other nematodes, *Ascaris*, *Trichuris*, or *Enterobius*.

LINNEWEH and HARMSEN (p. 935) have found that, with various antigens prepared from *T. spiralis*, skin tests and complement fixation tests are useful for diagnosis, but that the precipitin test is not. They prefer antigens derived from rat muscle to those from pig muscle.

PERRIN (p. 711) has investigated the keeping property of the Bachman-Bozicevich *Trichinella* antigen (prepared without phenol) ; he suggests that it cannot be kept in effective condition longer than 18 months.

MELCHER and CAMPBELL (p. 328) report the isolation of a polysaccharide from *Trichinella spiralis* which gives good precipitation with sera from infected rabbits, and positive skin reactions.

BARON and BRUNNER (p. 477) have been able to sensitize the skins of normal persons by injecting antigens derived from larvae of *T. spiralis* digested from muscle of infected rabbits. Sensitization may be effected by skin test doses of the antigen, and the diagnostic value of these skin tests therefore diminishes with repeated intracutaneous injections. Tests with *Ascaris* antigens indicate that there is a component common to both *Ascaris* and *Trichinella*.

CULBERTSON (p. 75) reports controlled experiments which show that infestation of mice with *Trichinella spiralis*, and vaccination with antigens prepared from the worms, protect against subsequent infection. The immunity conferred is effective against the intestinal

phase of the parasite, but infestation gives more protection than vaccination. Passive immunization with serum from infected animals also gives protection, but this is less effective than that conferred by previous infestation.

The same author (p. 77) presents the results of experiments on the effectiveness of passive immunity against *T. spiralis* in rats. After injection of immune serum the development of the worms in the intestine is checked, as it is by active immunity, but the check is not so effective, though there is no reason to suspect a qualitative difference.

Culbertson (p. 794) sums up his work by stating that the transmission of immunity against *Trichinella spiralis* from mother rats to their young takes place largely or entirely by ingestion of the milk of the immune mother; little or no transmission occurs during intrauterine life.

Other Nematodes.

Hosford *et al.* (p. 257) report the second known case of infection of man with the Spirurid nematode *Thelazia californiensis*, a parasite of dogs, sheep and deer. The worms are found in the eye, but do not penetrate the conjunctiva; they can, therefore, easily be washed out. Their life history is not known, but presumably an arthropod intermediate host is involved.

Kasimow (p. 326) reports the first case of human infection with the nematode *Ostertagia circumcincta*, from Azerbaidjan.

Anthelmintics.

Bercovitz *et al.* (p. 929) have investigated the therapeutic value and toxicity of phenothiazine in various infections; details are given in the original abstract. They conclude that it can produce toxic effects in an appreciable number of patients, and that it is not an effective anthelmintic or amoebicide. Most (p. 930) has given phenothiazine to 22 patients, with mild toxic effect in two. The total dose should not exceed 300 mgm. per kgm. body weight (*i.e.* about 15 gm. for an adult) given over a period of three to five days. The author, however, considers gentian violet the drug of choice for *Enterobius* infections. Grant (p. 932) emphasizes the danger of the use of phenothiazine for the treatment of *Enterobius* infection, and quotes a non-fatal case of poisoning.

Sisk (p. 927) has tried phenothiazine in the treatment of *Enterobius* infection. Toxic effects were produced in a number of patients submitted to a five-day course, but the author considers that, for adults and children over the age of six, a dose of 1 gm. daily, for six days, followed by a rest for eight days and then by 1 gm. daily for six days, is successful and safe. Doses for younger children are detailed. Elliott (pp. 702, 931) writes favourably of the effect of phenothiazine in various helminthic infections in West African troops, but in comment, Lapage points out that much more evidence is required to establish the effect of this drug on the nematodes of man, and refers to the risks associated with its administration to man and animals.

Mukerji and Ghosh (p. 922) show that there is progressive deterioration in the ascaridol content of oil of chenopodium when kept at 70° to 98°F., either in the light or in the dark. The deterioration is more rapid in the first than in the subsequent two years.

ERHARDT (p. 60), and EICHHOLTZ and ERHARDT (p. 61) have written at some length on new anthelmintics, with special reference to the phenol derivative 430 Kl, the composition of which is not more fully given. This product is very effective against *Ancylostoma caninum*, and is claimed to be a great advance on the known anthelmintics, but it is chemically unstable, has an almost intolerable taste, and markedly irritates the mucous membranes. The action of various other drugs, on a number of worms, is discussed.

JAFFÉ (p. 612) has studied the sap of fig trees, which is used as an anthelmintic. The active agent is the proteolytic agent "ficin," which *in vitro* has a digestive action, in alkaline media, on *Ascaris*, *Necator* and other nematodes.

Immunity.

TALIAFERRO and SARLES (p. 319) have studied passive immunity to *Nippostrongylus muris* infection in rats by injecting immune serum into the animals before infection, and by noting the response in egg production, and in post-mortem examination of animals killed some days after infection. Eggs appeared in the faeces after a slight delay, as compared with the normal, and total egg production was smaller. The rats showed high but transient immunity, and the effects on the worms were similar to those seen in animals actively immunized by repeated infections with large numbers of larvae, but were less in degree. The inflammatory responses were similar to, but of smaller degree than, those in actively immunized rats. WATT (p. 792) has produced a marked degree of immunity against *Nippostrongylus muris* by injecting into rats the filtrate of a saline extract of adult and larval worms. The immunity is effective against the larvae in the lungs and against the intestinal phases of the worm, and possibly against larvae in the skin. WATT *et al.* (p. 793) have taken this matter a step further by showing that lack of vitamin A in the diet lowers the resistance of rats to primary infection, and to reinfection, with *Nippostrongylus muris*. RILEY (p. 793) reports to the same effect. *Charles Wilcocks.*

MALARIA.

SIVALINGAM, V. **Spleen and Parasite Surveys in Ceylon.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 261–5, 3 maps.

Spleen and parasite surveys in Ceylon, carried out by SIVALINGHAM and RUSTOMJEE in the early months of 1938 and 1939, have previously been reported [this *Bulletin*, 1942, v. 39, 663]. The surveys now reported were made in 1940.

Immediately after the conclusion of the 1939 surveys a severe epidemic of malaria broke out, involving the endemic areas of low to moderate intensity in the Western and Southern Provinces and the true epidemic zones of the North-western and Sabaragamuwa Provinces. The low to moderately endemic areas round Kandy and Matale were also involved. The dry zone was not affected. The epidemic lasted till the end of July. The results of the 1940 survey reflect the effects of this epidemic.

The dry zone spleen rates were substantially similar to those of previous surveys. There was a rise of 10–20 per cent. in the spleen rates in much of the intermediate zone, and a great increase in the rates in the northern part of the wet zone which occupies the south-west corner of the island. Corresponding changes in the parasite rates were observed.

The parasite rates were based on the examination of the blood of 19,906 schoolboys. The percentages of species of parasite found were : dry zone (776 of 8,760 positive) *P. malariae* 37·4, *P. falciparum* 39·4, *P. vivax* 23·2 ; intermediate zone (237 of 5,401 positive) *P. malariae* 49·6, *P. falciparum* 26·1, *P. vivax* 24·3 ; wet-zone (110 of 5,745 positive) *P. malariae* 40·2, *P. falciparum* 29·5, *P. vivax* 30·4.

Norman White.

SHIPITSINA, N. K. [**The Area of Water-Surface which is filtered by an *Anopheles* Larva in Feeding.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1943, v. 12, No. 2, 14–24, 5 figs. [In Russian.]

The author studies the activities of the *Anopheles* larva when feeding, and the effect of administering precise dosages of poisoned dusts.

When the larva is feeding it produces a centripetal current in the surface layer of water. This current flows towards the mouth brushes, for an angular width of 250° : it is strongest in the area immediately in front of the larva. After it has passed the mouth brushes the water goes away at a lower level, in two streams which are directed downwards and to the sides.

The fourth stage larva produces a very considerable surface current, flowing towards the larva over a radius of 8 mm., and some slight current up to about 20 mm. The area which is filtered by the fourth stage larva is, therefore, some 8 sq. cm. : in the first stage it is about one-fortieth of this, say 20 sq. mm. Needless to say, these figures are much modified by larval activity and so forth. But the differences of effective filtration of large and small larvae are so great as to require to be considered, in applying powder poisons.

If the water surface carries much dust, this limits and reduces the feeding of the larvae, and this is particularly true of those of the first instar.

When Paris green is applied to the water under laboratory conditions, it may be about equally effective against the first and fourth stage larvae. But, as the author rightly observes, the dose per unit area has to be greatly increased in the field if one wishes to kill those in the first instar. It seems true that both existing methods of application, and also the dusts themselves, are imperfect.

[This author has already published a series of studies on the feeding habits of *Anopheles* larvae, the area of surface from which they can filter their food, the number of floating particles swallowed per minute, and the effect of temperature, density of particles and so forth. It seems probable that this paper, which is evidently important, brings together much of the information which she has published before.]

P. A. Buxton.

WHITE, R. Senior, ADHIKARI, A. K., RAMAKRISHNA, V. & ROY, B. B. **On Malaria Transmission on the Orissa Coastal Plain.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 159–86. [14 refs.]

This is a report of investigations carried out by the Bengal-Nagpur Railway malaria staff between 1935 and 1942.

The Orissa coastal plain is a strip of alluvium extending from Puri to the northern boundary of the Province, 172 miles. It lies between the Singhbum hills and the Bay of Bengal and is nowhere wider than 100 miles. It is crossed by the Subarnareka, Barabalong, Salindi, Bhaitarani, Brahmini and Mahanaddi rivers. A series of more or less derelict canals run across the line of drainage. The riverain tracts are liable to serious floods.

Eighteen species of anophelines have been found in the plain: *A. hyrcanus*, *A. barbirostris*, *A. subpictus*, *A. vagus*, *A. sundaicus*, *A. culicifacies*, *A. fluviatilis*, *A. varuna*, *A. aconitus*, *A. jeyporiensis*, *A. karwari*, *A. tessellatus*, *A. splendidus*, *A. ramsayi*, *A. jamesi*, *A. annularis*, *A. pallidus* and *A. philippinensis*. Several of these species are rarities. *A. annularis* is much the most prevalent and formed 71 per cent. of all collections made for dissection. *A. pallidus* formed 11 per cent., *A. aconitus* 7 per cent. and *A. culicifacies* 6 per cent. Only two species have been found with sporozoites, *A. aconitus* and *A. annularis*. Three other species have been found with oöcysts on a single occasion each, *A. culicifacies*, *A. pallidus* and *A. ramsayi*. In all 12,987 dissections of 13 species, caught mainly in houses, were carried out.

The principal vector on the coastal plain as a whole is *A. annularis*. It breeds in still water containing floating vegetation and filamentous algal growth, chiefly in tanks and ricefields. Its transmission season extends from September to November or possibly December. It is more common in cowsheds than in human habitations but shows an increasing tendency to enter the latter in November. Its adult life is greatly prolonged in autumn, at which season it breeds with maximum intensity.

A. aconitus in certain places was the only vector incriminated during seven years' work. Its breeding places are similar to those of *A. annularis*, but water in slow movement is rather more favoured. It transmits from September to December. Its greatest density is from January to March when, however, it has not been found infective. Its infection rates were twice as high as those of *A. annularis* but the density of the latter is ten times greater.

Malaria epidemics in Orissa are superimposed on a considerable endemicity; they are very local and apparently dependent on biological factors favouring *A. annularis*.

Very detailed protocols accompany the report. *Norman White.*

WHITE, R. Senior & RAO, V. V. **On Malaria Transmission around Vizagapatam.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 187–205. [18 refs.]

Vizagapatam is situated on the only short stretch of the 1,000 mile Indian coast of the Bay of Bengal on which spurs of the Eastern Ghats now come down to the sea. It is a relatively healthy area but it has long been known that malaria is a considerable problem in the neighbourhood of Vizagapatam. In 1925, when work was started to convert

part of the shallow protected backwater into a deepwater port, malaria surveys were undertaken. These appeared to show that *A. culicifacies* was the vector. When control work was started in the adjacent railway area of Waltair in 1927, and at Gopalapatnam junction four miles to the west in 1930, special attention was paid to *A. culicifacies*, *Anopheles* of the *funestus*-group and *A. stephensi*. The control was effective. Twenty-two species of *Anopheles* have been found in this area, but only 14 of these are other than rarities.

Subsequent long-continued observations in villages and places round Vizagapatam are described in detail. They indicate that *A. culicifacies* is not a vector locally. The single specimen found with sporozoites may have owed its infection to artificial conditions. *A. stephensi mysorensis*, with a sporozoite rate of 1·75 per cent., is the principal rural vector. It has been found infected in August, October, November, January and February. Nalas and irrigation channels are the preferred breeding places of this species (79 per cent.); *pucca* wells are more attractive than *kutcha* wells as breeding grounds for the remaining 21 per cent. *A. varuna* had a sporozoite rate of 0·017 per cent. It showed very little inclination to bite man and was rarely found in human dwellings. In these respects it differs from *A. varuna* of the Jeypore Hills, where it is an important vector. It is interesting to note that the eggs of the Vizagapatam *A. varuna* are definitely shorter than those of *A. varuna* of the Singhbhum Hills. The species can be neglected as a factor in malaria epidemiology around Vizagapatam.

Norman White.

WHITE, R. Senior. **On Malaria Transmission in the Hazaribagh Ranges, including Ranchi Plateau.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 207–31, 1 map & 1 graph.

The large tract of country forming the subject of this paper is an eastern extension of the Eastern Satpura Ranges, malaria transmission in which was described by the author and ADHIKARI in a previous publication [this *Bulletin*, 1941, v. 38, 560]. The work now described was started in 1936 and the conclusions are based on the results of dissection of 17,500 *Anopheles*. Collections of *Anopheles* were made in places in the Korea Coalfield area, in the Eastern States Agency area through which the main Bombay-Calcutta railway line passes, in Jharsuguda (a town in the extreme north-west of Orissa), and on the Ranchi plateau. The recorded anopheline fauna of this large area comprises 21 species which are listed.

Very diverse malaria conditions prevail in different parts of the Hazaribagh Ranges. At the eastern end epidemicity is superimposed on endemicity. The west and south are hyperendemic areas. Conditions in the centre of the ranges, where communications are difficult, are unknown. The principal malaria vector of the Hazaribagh Ranges is *A. fluviatilis*; it transmits the disease from September to March. *A. varuna* is comparatively rare; it formed only 6 per cent. of adults of the *fluviatilis-varuna* group captured. It thus probably plays an unimportant part in transmission, though it is the only species that has so far been found infective in the Korea Coalfield. *A. culicifacies* transmits to some extent from July to September; it is responsible for moderate endemicity on the Ranchi Plateau.

The town of Jharsuguda, some miles from the southern face of the hills on black cotton soil, was reputed to be very healthy. In 1940

there was an epidemic of malaria caused apparently by an increased breeding of both races of *A. stephensi* in the more than 500 wells of the town. *Norman White.*

PRITCHARD, A. E. & PRATT, H. D. **I. A Comparison of Light Trap and Animal Bait Trap Anopheline Mosquito Collections in Puerto Rico. II. A List of the Mosquitoes of Puerto Rico.** *Pub. Health Rep.* Wash. 1944, Feb. 18, v. 59, No. 7, 221–33, 7 figs. (2 on pls.).

The authors carried out experiments lasting over several months in Porto Rico in which the catches of anopheline mosquitoes, mainly *Anopheles albimanus*, in a light trap were compared with those in an animal bait trap. The two types of trap were situated from 200 to 500 feet apart. The light trap consisted of a vertical metal cylinder nine inches in diameter and twelve inches long. The upper end carried a fan. A short distance above the cylinder there was an inverted funnel-shaped roof carrying an electric light bulb (25–60 watts). The insects which entered under the roof were blown into a cyanide killing bottle by means of the fan. The animal trap consisted of a hut 8 feet long by 5½ feet wide and 5½ feet high. There was a v-shaped entrance along each side and the upper half of the walls consisted of mosquito netting. The trap was baited with a small horse or a calf.

The tests carried out led to the following conclusions concerning *Anopheles albimanus*. The light trap provides a more standardized and easily managed way of sampling the mosquito population since the intensity of the light can be controlled, and by means of a time switch the apparatus can be made automatic. The catch can be collected at any time. The apparatus is portable and catches both males and females, and the latter may be fed or unfed. The animal trap possesses none of these advantages, but on the other hand it can be run in remote places since it needs no electric supply, and also it has the advantage that the catch is not mixed up with a very large number of other night flying insects. It is suggested that the combined use of the two types of trap would give the best results.

The light trap caught very many more *A. albimanus* than the animal trap, nightly collections at the former ranging from 320 to 828 when the animal trap caught a maximum of 245. It often happened therefore that the light trap collected significant numbers of these mosquitoes when the animal trap gave numbers below the five females per night or fewer accepted as a criterion of satisfactory control in Porto Rico. [It has recently been shown (WEATHERSBEE, this *Bulletin*, 1944, v. 41, 643), that the horse is a very much more satisfactory and attractive bait for *A. albimanus* than man; the latter gave low catches in comparison.] The paper gives some information on two other species of considerably less importance, *A. vestitipennis* and *A. grabhami*, and a list of Porto Rican mosquitoes is appended. *W. A. L. David.*

Malarial Vectors in Areas investigated by the Inter-American Co-operative Health Services. 3 mimeographed pp.

This information has been compiled in the Medical Section of the Division of Health and Sanitation in collaboration with Mr. W. H. W. Komp, consulting entomologist. It contains lists of vectors and probable vectors of most of the Central and South American Republics.

Schilling, C. Nachweis von Antikörpern im Blute Malariakranker. [**Antibodies in the Blood of Malaria Patients.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 212–19, 1 fig.

In 1933, Neumann [this *Bulletin*, 1933, v. 30, 859; *ibid.*, 1934, v. 31, 190 (title)] reported experiments, the results of which appeared to indicate the presence of antibodies in the blood after an attack of malaria. The experiments were carried out by removing infected blood from a patient before an impending attack, and keeping it in the cold. After the malarial attack, blood was again withdrawn and the serum separated. A quantity of this serum was added to a portion of the parasite-containing blood which had been kept in the cold. It was found that the mixture of blood and serum failed to produce infection when injected, whereas the original blood in four cases was proved to be fully virulent. It was concluded that the serum contained antibody which was capable of destroying the malaria parasites. In the present paper the author has extended these observations by 11 tests on nine cases. The results indicate that antibodies can be detected in the blood as early as seven hours after the height of the fever, but they can be demonstrated most readily between the twelfth and eighteenth hours. After this, it was no longer possible to demonstrate their presence. *C. M. Wenyon.*

Dixon, K. C. **Post-mortem Appearances of Malignant Tertian Parasites.** [Memoranda.] *Brit. Med. J.* 1944, June 24, 845.

Referring to a fatal case of cerebral malaria [Sneddon, this *Bulletin*, 1944, v. 41, 259], in which malaria parasites could not be stained in sections of the brain, the author mentions the relatively simple method of confirming a diagnosis by staining smears of the brain (and spleen) with Leishman's stain. In smears of the cerebral cortex "chains of parasites are seen occluding the cerebral capillaries. The parasites stain blue and each contains a dark mass of pigment. . . . The red cells in which the parasites are contained are not readily distinguishable, however. Most of the parasites appear to be schizonts." In smears of the spleen enormous numbers of schizonts are seen in all stages of schizogony. This method is rapid and better for the purpose than preparing sections. [In circumstances where opening the skull is not practicable, the method of obtaining brain tissue, for smears, by means of a large exploring needle, attached to a syringe, passed through the orbital plate of the frontal bone under the eyelid, would be useful—see Daniels and Newham, "Laboratory Studies in Tropical Medicine," 5th Ed., 1923, p. 131, Bale, London; see also Raja, this *Bulletin*, 1922, v. 19, 864.] *J. F. Corson.*

Hamburger, H. J. **Clinical Observations on Malaria Cases with Dangerous Cerebral Manifestations.** *Indian Med. Gaz.* 1944, Jan., v. 79, No. 1, 10–12.

The author describes six cases of cerebral malaria, two of which terminated fatally in spite of intensive treatment. The diagnosis in one or two of these cases was not very definitely established. The clinical notes form the text of some general observations on cerebral malaria. Sugar or albumin in the urine is a sign of imminent danger.

The absence of splenic enlargement in such grave cases may be an indication of weakness of the defence system. A fixed temperature round 101°F. seems to point to affection of the heat centre possibly due to anoxaemia caused by blocking of parasite-filled capillaries. It is at any rate a sign of danger. Infusion therapy should be handled carefully; it is not certain if the brain be in a state of oedema or of dehydration, in such cases. *Norman White.*

YOUNG, G. B. & MACADEN, C. J. A. **Cerebral Malaria.** [Correspondence.] *Brit. Med. J.* 1944, May 13, 670.

Writing from India, Young and Macaden condemn the intravenous injection of quinine as the first step in the treatment of cerebral malaria; they state that large intravenous doses are invariably followed by death. Their procedure is to give an intramuscular injection of quinine as soon as diagnosis is confirmed. If the patient is very collapsed a small intravenous saline may be given at this time, but never intravenous quinine. Four to six hours later a *small* intravenous injection of quinine is given: 3 to 6 grains are ample; this may be repeated to a total of three injections at intervals of four to six hours. Adrenaline, if given at all, is given intramuscularly just before the intravenous quinine. They report good results. *Charles Wilcocks.*

SEELIG, S. F. & HEMMING, J. R. **Megalocytic Anaemia as a Sequel to Malaria.** *Lancet.* 1944, Apr. 15, 498–9.

The observations recorded were made in a combined general hospital on field service which received and evacuated large numbers of cases of malarial infection. Many patients with a history of recent fever, or who were actually suffering from malaria (*P. falciparum* infections), presented the picture of pernicious anaemia without involvement of nerve tissue. The blood findings in 23 of these patients are given. All the patients were Indians. All cases showed a severe megalocytic anaemia, with considerable aniso-poikilocytosis, frequent punctate basophilia, small and large nucleated red cells, leucopenia, and well marked hyperchromasia. Antimalaria treatment supplemented by iron, liver, and a full diet was successful. The cases were considered to be tropical or nutritional macrocytic anaemia in patients who had been exposed to severe hardship and broke down under the added stress of malaria. The inadequate treatment of the malaria, the relatively late diagnosis of the anaemia and delay in starting effective iron and liver treatment were contributory factors. *Norman White.*

KIKUTH, W. Zur Frage der Frühjahrsrezidive der Malaria tertiana. [**Spring Relapses in Cases of Tertian Malaria.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 148–57.

It is now well known that, in Europe, cases of benign tertian malaria are very liable to suffer relapse in the spring of the year following that in which the infection was contracted, and this in spite of vigorous treatment at the time the first malarial attacks occurred. Furthermore, certain patients suffer from their first attack in spring, though infection undoubtedly occurred in the previous year. In such cases there has been an incubation or latent period of eight or nine months. In the paper under review, the author discusses these phenomena in the light

of present knowledge, particularly that concerning the development of sporozoites in cells other than red blood corpuscles, leading to the exoerythrocytic cycle of development. It was thought at one time that changes in climate associated with the advent of spring, and the more active life of the individual at that time of the year, might be responsible for the spring relapse. It was shown, however, by SWELLENGREBEL, JAMES [this *Bulletin*, 1931, v. 28, 566] and others that this tendency to prolonged latency was not a feature of all strains of *Plasmodium vivax*, while paralytics experimentally infected at different times of the year still relapsed after eight or nine months without any special reference to spring. It was thus clear that the tendency to relapse after an eight or nine month interval was a feature of certain strains of *P. vivax*, particularly those of European origin, and that it was not dependent on factors outside the parasite itself. The author notes that before the discovery of the exoerythrocytic forms in bird malaria, it was usually assumed that a small number of erythrocytic parasites persisted in the circulation, and that it was there that they became active after the long latent period. Now it is more generally held that it is the exoerythrocytic stages which persist in these cases, and it is they which become active to re-establish the blood infection which gives rise to the spring relapse.

On the subject of treatment the author notes that it has been clearly demonstrated that in bird malaria none of the known therapeutic agents is able to influence the exoerythrocytic stages, though plasmoquine has been shown to have a slight action. It is assumed that human malaria behaves in the same way. In support of this are the observations that the tendency of benign tertian malaria to relapse is lessened to some extent if the eradication of the blood infection is associated with or followed by a course of plasmoquine. Thus a number of observers have shown that a 21-day course of quinine with a daily dose of 0·02 to 0·03 gm. of plasmoquine will reduce appreciably the relapse rate of benign tertian malaria. A similar reduction, according to PIEBENGA [this *Bulletin*, 1932, v. 29, 710], followed a two weeks' course of three tablets daily of quinoplasmin (" 0·3 gm. of quinine and 0·03 gm. of plasmoquine "). [KIKUTH here has made a mistake. Each of the tablets used by PIEBENGA contained 0·3 gm. of quinine sulphate and 0·01 gm. of plasmoquine.] Other workers have reported still better results when this treatment was extended to three weeks.

When attempts are made to extend the combined quinine-plasmoquine treatment to atebrin and plasmoquine, certain unforeseen difficulties are encountered. Thus, the daily administration of 0·3 gm. of atebrin and 0·03 gm. of plasmoquine produces certain unpleasant toxic symptoms, which the author regards as of a synergic nature. Similar results are obtained when a five to seven-day course of atebrin is followed by a three-day course of 0·02 to 0·03 gm. of plasmoquine. To overcome this difficulty, the Atepe tablet, consisting of 0·1 gm. of atebrin and 0·005 gm. of plasmoquine, was introduced. All observers are agreed that from the point of view of suppression of relapses, the combined atebrin-plasmoquine treatment, even when the dose of the latter is at a minimum, as in the Atepe tablets, is very successful. It does not appear, however, that anyone has carried out a careful comparative test with the quinine-plasmoquine treatment, so that it is not possible to state to what extent the one is better than the other. Such a comparison was indeed made by AMY and BOYD in India [this

Bulletin, 1937, v. 34, 52], but this had reference only to the early relapses of benign tertian malaria, for the long-term relapse is not a feature of Indian malaria. In fact, it would seem impossible to carry out a satisfactory test on suppression of the long-term relapse in the tropics, where chances of reinfection are common. There are thus insufficient data available to answer the question whether some sort of continuation of atebrin and plasmoquine administered over three weeks will or will not be more effective in reducing the incidence of the long-term or spring relapses of *P. vivax* infections than the three weeks' quino-plasmoquine treatment of PIEBENGA and VAN ANDEL in the case of European malaria. *C. M. Wenyon.*

RODGER, L. M. **Malaria as a Non-Relapsing Disease. A Review of 1,619 Cases in Northern Rhodesia.** *Lancet.* 1944, Apr. 22, 533–4.

The author gives an interesting account of his experience of malaria on a mine in the copper belt of Northern Rhodesia. Malaria is hyperendemic in the neighbourhood; native children have spleen and parasite indices of from 50 to 60 per cent. The European community of 2,500 live in an area so well protected by antilarval and antimosquito measures that the average expectation of an attack of malaria is once in seven to eight years. European employees, over 1,000 in number, are not allowed a day off work, or allowed to return to work, without a medical certificate. No quinine is issued except during treatment. Every patient is treated in hospital. No antimalaria treatment is given unless parasites have been found in the blood. Thus almost unique opportunities exist for keeping the population under medical supervision. *P. falciparum* infections are most numerous. Among 1,157 persons infected during a five-year period, *P. vivax* was found in 18, *P. malariae* in 20 and *P. ovale* in 27. The species of parasite was undetermined in 58.

The routine treatment of malaria consists of 10 grains of quinine by mouth three times a day for nine days; after this the employee returns to work but is given 15 grains of quinine a day for a week. If in the initial stage the patient is seriously ill, or complains of nausea, quinine is given intravenously twice a day for one or two days. For intravenous injection 10 grains of quinine hydrochloride in 20 cc. distilled water are given in not less than five minutes and preferably when the temperature is not over 100°F. Intramuscular injections are given only to young children. Mepacrine is used if there be a history of blackwater fever or quinine idiosyncrasy, 0·1 gm. thrice daily for seven days. Intravenous mepacrine is given if necessary, 0·15 to 0·2 gm. *P. ovale* infections are treated with quino-plasmoquine, as are some cases of *P. malariae* infection.

The chief interest of the paper is the very low relapse rate of cases of malaria that have been adequately treated. During the five-year period 72·7 per cent. of infected persons suffered no second attack. Among the remaining 27·3 per cent. a large proportion of second attacks appear to have been due to reinfections and not relapses. This is shown by the distribution of cases. Cases of malaria are for obvious reasons more numerous along the outskirts of the residential area than in the centre. Second attacks are proportionally more numerous among patients living in the outskirts than in the centre.

The author concludes that malaria can be a non-relapsing disease provided that it is treated at once and treatment is completely supervised. It is one of the essentially curable diseases. *Norman White.*

EDGE, P. G. **Malaria and Nephritis in the British West Indies.** *Caribbean Med. J.* 1944, v. 6, No. 1, 32–43.

In this paper EDGE has attempted, from an examination of the data given in the Annual Medical Reports and the Reports of the Registrars-General of 14 of the British West Indian Colonies, to determine whether malaria and nephritis are so closely associated that malaria may reasonably be regarded as an important cause of nephritis, and whether some particular species of *Plasmodium* is the responsible agent.

The number of deaths certified as due to nephritis in these Colonies is high, almost as high as the number certified as due to malaria, and in general it is observed that where the malaria rates are high the nephritis rates are also high, though there are notable exceptions. For instance, Bermuda has a high nephritis rate, but malaria is practically non-existent. The same is true of Barbados. On the other hand, in Ceylon and the Federated Malay States the proportion of hospital in-patients treated for malaria is high, and the proportion treated for nephritis is relatively low, in comparison with the West Indies. Yet in West Africa, an area even more malarious than the Far East, the in-patients treated for malaria are relatively few, and those treated for nephritis form a greater proportion even than in the West Indies. It is, of course, probable that in this hyperendemic area, where immunity plays so large a part in the course of malaria in adults, relatively little in-patient treatment is given. In that case the in-patient figures do not represent the true incidence of malaria, but it is not clear why the same reasoning does not apply to Ceylon and the Federated Malay States. The explanation may be that hospital accommodation and communications are better in the far east.

GIGLIOLI [this *Bulletin*, 1930, v. 27, 508] holds the view that malarial nephritis is closely associated with *P. malariae* infections. In the present enquiry Edge has failed to find data which throw light on this question.

The author concludes by observing that official records are of little value for the investigation of scientific problems of this kind, and urges the importance of good medical book-keeping.

Charles Wilcocks.

JOHANNESSOHN, F. Was ist Prochinin? [**Composition and Uses of Prochinin.**] *Münch. med. Woch.* 1943, Nov. 5, v. 90, No. 44/45, 635–6.

"Prochinin," introduced as a war-time substitute for quinine, is a mixture of cinchonine (47·5 per cent.), cinchonidine (47·5 per cent.) and quinidine (5 per cent.). Chemotherapeutic tests on mice, rats, rabbits, guineapigs and canaries; tests of its inhibitory action on diastase, pepsin and yeast; of its effect on fever, blood pressure, hyperglycaemia and on smooth muscle; and of its excretion in the urine; all gave very similar results to those obtained with quinine.

It has been used clinically: in Greece a daily dose of 1·5 gm. was given for benign tertian malaria; the blood became free from parasites on the fourth day, at latest on the eighth day, and fever ceased on the fourth day. After 20 days' treatment relapses occurred in 7 per cent. In hyperthyroidism 0·2 gm. three times a day, sometimes combined with phenobarbitone (luminal) was successful. In arrhythmia and extrasystole doses of 0·08 to 0·4 gm., several times a day, gave good

results. In obstetrics, a dose of 0·25 gm. repeated after an hour, was given, after rupture of the membranes, to promote parturition.

J. F. Corson.

Scudi, J. V., Jelinek, Viola C. & Kuna, S. **Biochemical Aspects of the Toxicity of Atabrine. I. Acute Effects of Massive Doses in the Rat.** *J. Pharm. & Exper. Therap.* 1944, Feb., v. 80, No. 2, 144–9. [20 refs.]

Groups of 50–80 rats were given by stomach tube a dose of mepacrine (atabrine) equivalent to 50 per cent. of the L.D. 50 (dose causing 50 per cent. mortality) *viz.* 450 mgm. per kgm. Group I rats were without prior fasting; no rats died. Group II rats had fasted overnight; 22 per cent. died in 30–60 minutes. Group III rats had fasted 36 hours; 48 per cent. died acutely. Group IV rats had been maintained on a low-protein diet and then made to fast for 36 hours; 58 per cent. died acutely. In a fifth group the animals were made to fast overnight and then treated with a dose 20 per cent. of the L.D.50; none died. In all groups, the surviving animals were killed 2–48 hours after the dose, and the blood and organs were taken for examination. At post mortem all the animals showed gastro-intestinal tracts distended with fluid; this distension was most marked in the animals killed after 6–24 hours. The contents of the small intestine were serous in nature, and in 5–10 per cent. of the animals they were tinged with blood. All the surviving animals had diarrhoea. The biochemical examination showed that severe dehydration and severe acidosis were produced within two hours after the administration of mepacrine. These conditions were maximal at six hours. Later (24–48 hours) a chloride deficit occurred in the blood. Severe necrosis occurred in the liver (Siegel). As judged by the retention of brom-sulphalein and prolongation of the prothrombin time, inhibition of liver function was produced by the drug and this inhibition was increased by fasting; plasma fibrinogen concentrations were appreciably increased by the drug.

F. Hawking.

Scudi, J. V. & Hamlin, Margaret T. **Biochemical Aspects of the Toxicity of Atabrine. II. The Influence of the Diet upon the Effects produced by Repeated Doses of the Drug.** *J. Pharm. & Exper. Therap.* 1944, Feb., v. 80, No. 2, 150–59. [22 refs.]

Four groups of about 25 rats each were kept on diets, low-protein—low-fat, low-protein—high-fat, high-protein—low-fat, and high-protein—high-fat, respectively. After several weeks, the rats were given 4·5 mgm. mepacrine (atabrine) per 100 gm. by stomach tube daily for six days each week; rats were killed after 3, 7, and 24 days respectively, and the blood and organs were taken for examination. Various tests for liver function, *e.g.* retention of brom-sulphalein, icteric index, prothrombin time, etc., gave no consistent evidence of abnormality, but the plasma fibrinogen was increased in all the animals except those on the high-protein—low-fat diet, in which the values were normal. Elevated fibrinogen values are usually associated with inflammation and tissue destruction and appear to be a sensitive indicator of mepacrine toxicity. All the animals (except those on the high-protein—low-fat diet which remained normal) lost weight and suffered from diarrhoea while the mepacrine was given. It is concluded

that the toxic effects of this dosage of mepacrine for rats could be largely prevented by a high-protein—low-fat diet.

Further experiments were done with dogs. In the first experiment, two dogs were given 50 mgm. of mepacrine per kgm. daily, while three other dogs were given 25, 10, and 5 mgm. doses respectively. The dogs receiving 25–50 mgm. per kgm. daily showed loss in weight, diminished food intake, anorexia, vomiting, and diarrhoea within 3–6 weeks; the plasma fibrinogen was increased in these animals, but in two of them it tended to return towards normal levels as the experiment proceeded. It is considered that the increase of plasma fibrinogen indicates destruction of liver tissue. The dogs on 5–10 mgm. per kgm. doses suffered from no marked symptoms even after 3–5 months.

The second experiment was performed on four dogs which had been subjected to severe depletion of protein by being kept on a low protein diet for three months; two dogs, similarly depleted of protein were observed as controls. The four dogs were given mepacrine, 10 mgm. per kgm. daily by mouth for six days each week. The dogs which received mepacrine showed increase of plasma fibrinogen after 13 doses, and after 31 doses the average value was 444 mgm. per 100 cc. (average in control dogs, 264 mgm. per 100 cc.). In the previous experiment, a dog given 10 mgm. per kgm. daily, but receiving a normal diet, did not show an elevation of plasma fibrinogen even after four months' treatment; while one which received 25 mgm. per kgm. daily showed augmented plasma fibrinogen only after one month. When the protein-depleted dogs were placed on high-protein diets, the change in the plasma fibrinogen due to mepacrine was reversed. In dogs treated with mepacrine there was no albuminuria or other evidence of renal damage.

F. Hawking.

BALLARD, C. W. & PIERCE, J. S. **The Assay of Pamaquin.** *Quarterly J. Pharm. & Pharmacol.* 1944, Jan.-Mar., v. 17, No. 1, 30–38, 1 fig.

FREEBORN, S. B. **Problems created by Returning Malaria Carriers.** *Pub. Health Rep.* Wash. 1944, Mar. 17, v. 59, No. 11, 357–63.

A very small proportion of troops now in the United States have as yet seen foreign service but already 75 per cent. of the malaria among troops in the Continental United States is of foreign origin. United States troops are stationed or engaged in nearly all the most important malaria centres of the world. Very large numbers of carriers may be expected when troops return from the fighting fronts. It would be quite impracticable to keep such troops under surveillance sufficiently long as to insure that they were free from infection before returning to their homes. As a solution to the problem Dr. L. L. WILLIAMS, Jr., proposed eradicating malaria from the United States by anti-anopheline attack in the endemic areas and the creation of mobile anti-anopheline units to control the expected explosive epidemic outside such areas. A consideration of the factors that have contributed to the shrinkage of the geographical distribution of malaria in the States from practically the whole country in 1880 to the south-eastern States at the present time indicates that an eradication problem is feasible and that, if proper precautions be taken, there need be little fear of malaria epidemics caused by the return of carriers from the theatres of war.

The Public Health Service is at present undertaking anti-anopheline programmes with the co-operation of 20 States, the District of Colombia,

and Porto Rico. In addition work is being done on 12 city programmes for the prevention of yellow fever and dengue in five States and the Territory of Hawaii. The antimalaria programmes are concentrated on war areas, Army and Navy establishments, critical war industries, and congregating, recreational or housing areas for service men.

As there will be comparatively heavy concentrations of potential malaria carriers at all general hospitals, their sites have all been surveyed, and if mosquito vectors are present, they are kept under inspection and control measures are applied whenever mosquito densities become moderately serious. Similar precautions have been taken with regard to prisoner-of-war camps.

More serious are cases of malaria occurring among members of the armed forces after their return home when they are not under close medical observation. The degree of vigilance of the local, county and State health authorities will decide how serious the establishment of each small focus of infection is to become. An explosive epidemic of 53 cases last summer in an area in which transmission is not easy yielded to an anti-mosquito and interior spraying programme.

A skeleton team of entomologists and engineers has been established in all the Public Health Service districts not included in the regular programme. These units keep under observation all places in which there are concentrations of malaria carriers. They will have one or more mobile control units which will be available at the request of the State for the suppression of localized outbreaks wherever they may occur. *Norman White.*

CARNEY, S. P. & LEVIN, N. B. **Chronic Malarial Parasitemia in Italian Prisoners of War.** *J. Amer. Med. Ass.* 1944, Apr. 8, v. 124, No. 15, 1048–9.

The observations recorded were made in an Italian Prisoners of War Camp, with a population of nearly 3,000, in an area where the absence of anopheline vectors makes local transmission impossible. All the prisoners had come from North Africa. The average length of service in malarious regions was two years. A blood examination of the men was made as a prelude to sending some of the men to work on farms; some of the proposed side camps were many miles from army hospital facilities.

Thick and thin blood smears were made from each man on each of two occasions at least two days apart. The total number of men examined was 2,723: 257 harboured parasites, 9·7 per cent. All were *P. vivax* infections except two *P. falciparum* and two *P. malariae*. Cases of active malaria numbered 56; these ceased abruptly with the onset of cooler autumn weather. Such an examination as was carried out does not reveal all carriers of infection. One patient was admitted to hospital with malaria only a week after a negative result to blood examination. Only a small proportion of men harbouring parasites gave a history of having suffered from malaria. More than half the men with active malaria denied previous attacks. *Norman White.*

BOMFORD, R. R. **The Human Factor in Military Malaria Control.** *Lancet.* 1944, June 10, 750–53.

These observations relate to the staff of a general hospital in a relatively healthy station in West Africa during 1941 and 1942, and

were designed to determine the reasons why some individuals get more malaria than do others. The results are inconclusive, as they relate to only a small body of men, but they are suggestive and indicate the need for further study.

Exactly 100 other ranks served with the unit continuously over a period of 13 months. These men had 156 attacks of malaria (2,000 man days in hospital); 27 had no attack, 29 had one attack, 22 two, 11 three, 7 four, 3 five, 0 six, and 1 seven. The attack rate per month according to rank seems significant: Officers 1·7, Sisters 1·9, Sergeants 7·7, Corporals 11·3 and Privates 14·2 per cent. The explanation is thought to lie in the better housing and feeding, and better facilities for rest and recreation, of the higher ranks. The incidence in " other ranks " doing night duty was 14·8 per cent. per month, as compared with 8·8 in those doing no night duty. The incidence of malaria was not related to the use of alcohol, nor to obvious ill-discipline and carelessness in other respects. Soldiers who had no mosquito net for one to three nights after arrival, and no mosquito boots, had a shorter average period before developing malaria than had the whole group.

The most sudden and serious rise in malaria incidence coincided with an outbreak of severe diarrhoea, traced to the breaking of a fly-trap of a large native latrine, which affected 44·6 per cent. of the unit. During this time the diarrhoea group had 60 per cent. more malaria than the non-diarrhoea group.

From the small number of observations it would seem that individuals have a varying liability to attacks of malaria, and that the assumption that a high incidence of malaria must be due to carelessness was not confirmed. Individual resistance is related to the general state of health and inadequate convalescence is a potent cause of early relapse. The maintenance of the highest possible state of general health, and attention to all social factors, are important. *Norman White.*

Boyd, M. F. **Present Day Problems of Malaria Infections.** *J. Amer. Med. Ass.* 1944, Apr. 22, v. 124, No. 17, 1179–87, 8 charts. [Refs. in footnotes.]

Bishop, Ann & Gilchrist, Barbara M. **A Method for collecting Sporozoites of *Plasmodium gallinaceum* by feeding Infected *Aedes aegypti* through Animal Membranes.** *Nature.* 1944, June 10, 713–14.

The authors have found that the mosquito *Aëdes aegypti* will feed through a chick skin membrane stretched over the end of a glass tube containing heparinized chicken blood. If the blood is from a bird infected with *Plasmodium gallinaceum*, the mosquitoes will become infected as readily as if they had fed on the chicken itself. It was also found that infected mosquitoes feeding through a membrane on uninfected blood injected sporozoites into the blood. Such sporozoite-infected blood produced infections when injected into chicks. It is evident that by this technique it is possible to obtain suspensions of sporozoites free from salivary gland tissues, as hitherto the only means of obtaining sporozoites was by dissection of the mosquitoes' salivary glands. Furthermore, it will be possible to test the action of chemotherapeutic agents on sporozoites in these suspensions. The membranes are prepared by soaking the skin of a 1–3-week-old chick in absolute alcohol for at least 30 minutes, washing it in running tap water, and

stretching it over a piece of glass tubing 2·5 cm. by 6 cm., and keeping it in place till dry by a thin rubber band. When dry the skin, thin and parchment-like, is firmly adherent to the end of the glass tube. The highest rate of gorging occurs when the contained blood (1·5–3 cc. of heparinized chick blood) is kept warmed to 41°–42°C., and the surface of the membrane is moistened with saliva. The membrane is placed in contact with the netting over the mosquito jar, and the whole kept in the dark in an incubator at 28°C. in a moist atmosphere.

C. M. Wenyon.

HAWKING, F. **Tissue Culture of Malaria Parasites** (*Plasmodium gallinaceum*). *Lancet.* 1944, May 27, 693–4, 4 figs.

In this preliminary communication the author reports the successful culture of the exoerythrocytic schizonts of *Plasmodium gallinaceum*. This was effected by commencing tissue cultures from the spleen, liver, marrow and brain of infected chicks. Growth of the tissues continued for fifteen days, when smears, suitably stained, showed various stages of development of the schizonts, including large multinuclear forms, and groups of uninucleate bodies which appeared to be merozoites. That multiplication had actually occurred was indicated by the large number of parasites present on the fifteenth day. Chicks were successfully infected by inoculation of eighth and ninth day culture material.

C. M. Wenyon.

BARRETTO, M. P. Malária aviária : III. Sobre o encontro de formas exo-eritrocíticas do "Plasmodium juxtanucleare" Versiani e Gomes, 1941. (Nota prévia.) [**Avian Malaria : Exo-erythrocytic Forms of** *P. juxtanucleare*.] *Hospital.* Rio de Janeiro. 1943, Nov., v. 24, No. 5, 643–5, 3 figs. English summary.

"Examining tissue smears from five chickens infected with *Plasmodium juxtanucleare* Versiani and Gomes, 1941, the author found rare unpigmented parasites in endothelial cells of the brain of two birds. One chicken was killed when the primary attack was ending, and the other during the first relapse. In smears from spleen, liver, bone marrow, and lungs exo-erythrocytic parasites were not seen."

PESSOA, S. B. & BARRETTO, M. P. Malária aviária. IV. Investigações sobre a ação de algumas novas sulfonas. [**Avian Malaria: Action of New Sulphones.**] *Hospital.* Rio de Janeiro. 1943, Nov., v. 24, No. 5, 647–52. [13 refs.] English summary.

"Using Roehl's method in canaries infected with *P. cathemerium*, the authors investigated the action of the following compounds :

4-Nitro-4′-acetilamino-diphenylsulfone.
4-Nitro-4′-amino-diphenylsulfone.
Sodium salt of acid dyphenylsulfon-4-Nitro-4′-azosalicylic.
Sodium salt of 4-Nitro-4′-carboxypropion-amido-diphenylsulfone.
4-Nitro-4′-propronilamino-diphenylsulfone.
4-Nitro-4′-carboxyacrilamido-diphenylsulfone.
4-Nitro-4′-carboxybenizoilamino-diphenylsulfone.
4-Nitro-4′-butirrilamino-diphenylsulfone.
4-Nitro-4′-benzoilamino-diphenylsulfone.

4-Nitro-4′-valerianamino-diphenylsulfone.
4-Nitro-4′-formilamino-diphenylsulfone.
4-Nitro-4′-thiourein-diphenylsulfone.
4-Nitro-4′-diaminophenylazo-diphenylsulfone.

The results obtained showed that these compounds have no action against *cathemerium* infections when administered by oral route."

BLACKWATER FEVER.

GREGORY, J. R. **A Short Note on Blackwater Fever.** *East African Med. J.* 1944, Apr., v. 21, No. 4, 98–100.

The author treats the vomiting and restlessness which occur in blackwater fever by the intramuscular injection of Phenobarbitonum Solubile B.P. [luminal-sodium] ; in adults he usually injects 10 grains first and a further 5 grains two hours later if restlessness is still present. This does not hinder the giving of sodium bicarbonate solution every two hours by mouth. Two cases in children are mentioned : a girl, aged seven years, was given by mouth an initial dose of 3 grains, followed by 1½ grains four-hourly for four doses, making a total of 9 grains ; a boy, aged six years, also received an initial dose, by mouth, of 3 grains, followed by 1½ grains three-hourly for three doses, making a total of 7½ grains. In both cases vomiting was controlled by the initial dose. The author contradicts the statement by BURKITT [this *Bulletin*, 1943, v. 40, 677] that the former gives the drug intravenously.

J. F. Corson.

TRYPANOSOMIASIS.

SCOTT, J. G. **Eye Changes in Trypanosomiasis.** *J. Trop. Med. & Hyg.* 1944, Apr.–May, v. 47, No. 2, 15–17. [23 refs.]

The author examined the eyes of 150 Africans and two Europeans who were infected with *Trypanosoma gambiense* ; the Europeans and 26 of the Africans were examined in hospital with the slit lamp microscope and ophthalmoscope before, during, and after treatment, while the remaining Africans were examined in their home surroundings with binocular loupe and ophthalmoscope after they had begun their treatment with antrypol (Germanin) and tryparsamide. The eye changes observed in the Africans are shown in the following table :—

Type of Case	No.	Keratitis	Irido-cyclitis	Choroido-retinitis	Optic atrophy
Hospital	26	9	4	nil	nil
"Bush" :—					
With dilated pupils	43	8	1	nil	nil
Undilated ...	81	25	2	nil	nil
Total ...	150	42	7	nil	nil

Keratitis was mostly caused by trachoma, only one case being attributable to trypanosomiasis; in one European it appeared in one eye and healed after one injection of antrypol. "Neither he nor the other European had increased aqueous flare or trypanosomes in the anterior chamber despite considerable numbers in the blood."

With regard to arsenical optic atrophy the author considers that Landolt's rings are preferable to the perimeter for testing acuity of vision as they make less demand on the patient's intelligence. In one patient who developed arsenical optic atrophy, vision was normal after the sixth injection of 2 gm. of tryparsamide, slightly reduced after the seventh though the fundi were still normal, but after the eighth injection it was reduced to 2/60 right and left with fundi still normal. Two months later the discs were pale and only light could be distinguished, and after another month the patient had unmistakable optic atrophy. The author advises the testing of vision before each injection; the slightest diminution of acuity is an urgent sign that treatment must be stopped. *J. F. Corson.*

Funke, A., Bovet, D. & Montezin, G. Sur quelques dérivés de l'éthylènediamine à action trypanocide. [**The Trypanocidal Action of certain Derivatives of Ethylene Diamine.**] *Ann. Inst. Pasteur.* 1943, Nov.-Dec., v. 69, No. 11–12, 358–71.

The first part of this paper is occupied by a description of the chemical preparation of the different compounds, 39 in all. They were tested by injecting them subcutaneously or orally into mice infected with *T. brucei*. Eight compounds proved sufficiently active to produce a permanent cure in at least three-quarters of the treated mice, *viz.*:—

2440 RP (*p*-ethylbenzylamino)-1 amino-2 ethane, $C_2H_5.C_6H_4.CH_2.NH.CH_2.CH_2.NH_2$

1986 F (*p-n*-propylbenzylamino)-1 amino-2 ethane

1921 F (*p*-isopropylbenzylamino)-1 amino-2 ethane

and the corresponding (*p*-sec. butyl-benzylamino)-, *b*-tetrahydro-menaphthylamino-, isopropyl-menaphthylamino-, methyl-2-isopropyl-5 benzylamino-, and chloro-4 benzylamino- derivatives. The other compounds tested had slight or no activity. Compound 1921 F, the most active of the group, was also shown to be equally active in guinea-pigs infected with *T. brucei*. Activity seems to depend upon the presence of a diamine structure in the chain, and on a second group *e.g.* $-C_2H_5$, substituted on the benzene ring. On the other hand, it is probable that the presence of a benzene nucleus is not essential for activity. These compounds form a new group of trypanocidal agents, belonging to none of the previously known chemical types.

F. Hawking.

Muraz, G. Un excellent test de la prophylaxie de la maladie du sommeil: le pourcentage, dans les collectivités, des trypanosomés en 2e période. Essais de médicaments nouveaux. Conditions d'une lutte effective. [**An Excellent Test of Prophylactic Measures in Sleeping Sickness: the Percentage of Cases in the Second Stage.**] *Bull. Soc. Path. Exot.* 1943, Nov. 10 & Dec. 8, v. 36, Nos. 11–12, 332–65, 2 pls.

The relative proportions of the first and later stages of the disease among cases of sleeping sickness diagnosed for the first time is regarded

by the author as a good indication of the efficiency, or otherwise, of antecedent prophylactic measures. The division is made by examination of the cerebrospinal fluid, patients with 0–5 cells per cmm. being in the first stage, those with 5–20 cells being classed as doubtful, and those with more than 20 cells being in the second stage. If frequent inspections of total populations have been made, early cases will have been diagnosed and cured ; if not, these cases will have passed on into the later stages. Administrative and agronomic prophylactic measures are as important as medical ones.

The author gives figures for 31 sectors of the seven French colonies for the end of the year 1940 ; they show the total numbers of infected people, total alive, number cured, deaths during the year, index of total infection, index of new infections, and index of " circulating virus " (*i.e.* the proportion of people who have trypanosomes in the blood). Judged by the author's standard only four sectors indicated that the local prophylactic measures had been satisfactory ; two (*Koudougou-Mossi* and *Dédougou*) are in the Upper Ivory Coast, one (*Labé*) is in Guinea, and the fourth (*Haute-Casamance*) is in Senegal.

Several factors contributed to produce these poor results : shortage of medical staff, shortage of transport facilities, insufficient support and collaboration on the part of the Administration, and sometimes a lack of enthusiasm on the part of the doctors. The author reiterates the need for frequent medical inspections and for the assembling of the whole of the village populations for these inspections, this being the duty of the Administration.

During the three years 1939–1941, when the author was directing a special campaign against sleeping sickness in A.O.F. and Togoland, much good work was done in spite of great difficulties resulting from the war and the armistice ; the most important result claimed is the reduction of the index of new infections, from 2·11 per cent. in 1938 to 0·74 per cent. at the end of 1941. [See also this *Bulletin*, 1942, v. 39, 744.]

In conclusion the requirements for a successful sleeping sickness campaign in the French colonies after the war are emphasized ; such a campaign would be a good investment, yielding a big dividend.

A short description of the signs and symptoms of sleeping sickness is given, together with the standard treatment and notes on three new drugs. The latter were named *Triazine arsinic acid* 4289 [this *Bulletin*, 1941, v. 38, 634], *azoarsinic acid* 4196, and *azoarsenobenzol* 4197 [this *Bulletin*, 1942, v. 39, 444]. The first-named, 4289, is a colourless preparation of pentavalent arsenic ; it was given by mouth (daily) or by subcutaneous or intravenous injection (every three days) in doses of 0·03–0·05 gm. per kgm. (limit 3·0 gm.). Six injections were followed by remarkably good results, sterilization of the blood being rapid ; the results were less definite in the case of the two other preparations.

J. F. Corson.

Hermosilla Diaz, F., Awad, S. & Rojas, M. Forma cardiaca de enfermedad de Chagas en un paciente Joven. [**The Cardiac Form of Chagas's Disease in an Adolescent.**] *Rev. Med. de Chile.* 1943, Sept., v. 71, No. 9, 892–6, 5 figs. [31 refs.]

LEISHMANIASIS.

SEN GUPTA, P. C. **The Treatment of Kala-Azar with Diamidino-Diphenoxypentane (M & B 800). Final Results of Treatment of the First 32 Cases.** *Indian Med. Gaz.* 1944, Feb., v. 79, No. 2, 49.

In a previous paper [this *Bulletin*, 1944, v. 41, 18], the author and NAPIER gave a preliminary report on the treatment of 32 cases of kala azar with diamidino-diphenoxypentane (pentamidine). Of these cases, 11 were resistant to previous treatment with antimonial compounds, but 10 made a prompt recovery with pentamidine. Of the remaining 21 ordinary cases, 19 recovered. During treatment, two patients (one resistant and one ordinary), died of associated complications. The dosage employed was similar to that used for diamidino-stilbene. It was pointed out at the time that an insufficient interval had elapsed since treatment to justify any statement as to permanent cure. In the present paper the author gives the results of his enquiry into the subsequent history. Of the 28 patients who recovered, 6 could not be traced, leaving 22 of whom the history is known. Of these, 10 were permanently cured, and 12 relapsed. The final conclusion is that, though the drug possesses some degree of curative action, it is inferior to diamidino-stilbene and to the best pentavalent antimonials. *C. M. Wenyon.*

SEN GUPTA, P. C. **The Treatment of Kala-Azar complicated with Pulmonary Tuberculosis.** *Indian Med. Gaz.* 1944, Feb., v. 79, No. 2, 50–51, 2 figs. on 1 pl.

It has generally been held that pulmonary tuberculosis is, of all complications of kala azar, the most serious, for, as NAPIER showed in 1937 [this *Bulletin*, 1938, v. 35, 178], the administration of antimonials is contra-indicated, since these drugs aggravate the tuberculous process to such an extent that a fatal issue is inevitable. At the time the antimonials were the only remedies for kala azar, but the situation has been altered by the discovery of the leishmanicidal properties of the diamidines, of which diamidino-stilbene is the most effective. Having in his charge a case of kala azar complicated by pulmonary tuberculosis, the author decided to treat it with diamidino-stilbene. During a period of 20 days 0·675 gm. of the drug was given intravenously in doses administered on alternate days. There was considerable improvement in the patient's condition, and no evidence of aggravation of the tuberculosis. Finally, it was clear that the leishmania infection had been eradicated. The patient was discharged as cured of kala azar, and told to attend a clinic for chest diseases. It would seem, therefore, that with the diamidines available, tuberculosis may no longer be such a serious complication as it has been considered hitherto.

C. M. Wenyon.

PARROT, L. & GOUGIS, R. Sur l'agent probable de transmission du bouton d'Orient dans la colonie du Niger. [**The Probable Vector of Oriental Sore in the Niger Colony.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Dec., v. 21, No. 4, 268–9.

Oriental sore is endemic in certain parts of the Colony of the Niger (French West Africa), especially around Tahoua, Agadès, Zinder, and Nguigmi, but the vector is not known. Recently, in the house of a

European who contracted oriental sore, to the west of Zinder, specimens of *Phlebotomus roubaudi* have been captured. This species very closely resembles *P. papatasi*, a known vector elsewhere, and the authors suggest that it is simply a variety of *P. papatasi*; it is therefore probable that *P. roubaudi* is the vector of oriental sore in that area.

Charles Wilcocks.

Luis Carri, E. Leishmaniasis tegumentaria americana. [**American Muco-Cutaneous Leishmaniasis.**] *Rev. Med. Latino-Americana.* 1943, Aug.-Sept., v. 28, No. 335/36, 552–63, 10 figs. [Bibliography.]

This article, a general illustrated review of present knowledge of S. American muco-cutaneous leishmaniasis based on a number of cases seen by the author in Northern Argentine, actually gives no new information, though it emphasizes the importance of the treatment of the early cutaneous stages before the condition has spread to the mucous membranes of the nose, mouth and pharynx. If the primary lesion remains untreated, then extension of the infection to the mucosae will sooner or later occur, resulting in destruction of the tissues of the nose and palate, and the repulsive disfigurements which are features of these cases. It is admitted that prognosis in the case of those with severe mucosal involvement is not good, and that treatment with tartar emetic, fouadin or antisyphilitic remedies only gives satisfactory results in some cases. For the purely cutaneous lesions, various local treatments, such as diathermy, X-rays with or without ionization, carbon-dioxide snow, injections of berberine, application of permanganate of potash powder, tartar emetic ointment, have all given good results. In spite of the extensive lesions, the victims generally remain in good health, and in many of the cases, after some years, healing with formation of scar tissue occurs. *C. M. Wenyon.*

Costa, O. G. **American (Muco-cutaneous) Leishmaniasis: Observations.** *Arch. Dermat. & Syph.* 1944, Mar., v. 49, No. 3, 194–6, 4 figs.

The author notes that the initial lesion of American leishmaniasis occurs on exposed surfaces in the following order of frequency:—face, ears, forearms, legs, and he illustrates his remarks with the description of a case in which the primary lesion was in the form of two ulcers on the right side of the back. He also describes a case of muco-cutaneous leishmaniasis, in which a nasal polyp developed. This is a rare complication of the disease. Diagnosis is made by the discovery of leishmania in the tissues of the polyp. Another case is illustrated, in which the initial lesion was in the form of an ulcer covering the whole of the mucosal surface of the very much thickened lower lip. Finally, a case is described in which a patient with lesions on the face and thorax developed a paronychia in the form of a painless ulcer surrounding the nail of the right thumb. Leishmania were discovered in the ulcer. The paper is illustrated by a series of photographs.

C. M. Wenyon.

FEVERS OF THE TYPHUS GROUP.

GIROUD, P., GIROUD, M. L. & MEUNIER, M. Méthode rapide permettant la séparation des rickettsies et de certaines bactéries des tissus qu'ils parasitent. [**A Rapid Method for separating Rickettsiae and certain Bacteria from Tissues.**] *C.R. Soc. Biol.* 1943, Nov., v. 137, No. 21/22, 703–4.

Micro-organisms can be isolated from infected tissues by the method of fractional centrifugation, but it takes a long time and the cellular debris is not always completely got rid of. The authors have found the following method to be rapid and simple. For the separation of rickettsiae from infected rabbit's lung the tissue is ground up and shaken for several minutes with certain oils in given proportions ; the cellular debris remains in the emulsion so-formed while the rickettsiae collect in the subjacent liquid. When a drop of this liquid is put on a slide the rickettsiae gather at the periphery of the drop and therefore are the more easily found. Paraffin oil, ground-nut oil, oil of pine, oil of turpentine, and doubly rectified terpinolene have been used. The method can also be used for the separation of other micro-organisms ; acid-fast bacilli, and even non-acid-fast strains of acid-fast bacilli, always remain in the emulsion while other organisms, Gram-positive or Gram-negative, are found, like rickettsiae, in the subjacent liquid. The method is useful for detecting small numbers of organisms in infected tissues. *J. F. Corson.*

BENGTSON, Ida A. **Complement Fixation in the Rickettsial Diseases—Technique of the Test.** *Pub. Health Rep.* Wash. 1944, Mar. 24, v. 59, No. 12, 402–5.

The author gives a detailed account of the methods employed in her well known investigations into the complement-fixation test as applied to murine typhus, European typhus, Rocky Mountain spotted fever, and Q fever.

The technique is quite beyond the scope of any ordinary laboratory ; it involves the availability of special skill and facilities as well as of the prolonged time needed for carrying out the tests.

The haemolytic system is of the usual type. The haemolysin is prepared from rabbits inoculated with washed red blood cells of sheep according to the technique of KOLMER or KILDUFFE. The complement consists of a pooled mixture of sera obtained from the heart blood of 10 to 15 guineapigs. The antigens are prepared from rickettsiae cultivated by Cox's method.

Full details are given of the meticulously careful methods used in preparing and titrating the above reagents so as to avoid every possible source of error.

In carrying out the tests, serum controls, antigen controls and haemolytic-system controls, are set up ; and, in addition to these, standard-serum controls are employed for each of which a pool is made of the sera of several animals which have recovered from the disease under investigation. Each set of pooled serum thus obtained is tested in the same dilutions as are used for the serum which is being tested.

This bald summary of the technique gives some idea of the conditions that must be fulfilled if the test is to be carried out in accordance with the high standards of accuracy observed by the author.

One simplification is mentioned as a possibility; this is the use of the Cox type of vaccine as an antigen when dealing with European typhus fever.

The original paper must be consulted by those who contemplate carrying out the test, but now that the diagnostic value of the reaction has been established it is to be hoped that a simplified technique will be evolved. *John W. D. Megaw.*

DYER, R. E. **The Rickettsial Diseases.** *J. Amer. Med. Ass.* 1944, Apr. 22, v. 124, No. 17, 1165–72.

GEAR, J., DE MEILLON, B. & DAVIS, D. H. S. **Typhus Fever in the Transkei.** *South African Med. J.* 1944, Apr. 22, v. 18, No. 8, 144–8.

[In a note by J. F. HERBST in the same number of the Journal it is stated that the Transkeian Territories lie in a corner between the Provinces of the Cape and Natal, and are administered by a Chief Magistrate who governs by special proclamation. There is a Health Officer, but no registration of births and deaths. The nutritional condition of the indigenous population has greatly deteriorated.]

Typhus fever, locally called "black fever," was first reported in a district of the territory by W. and R. L. GIRDWOOD in 1909, but the "officer responsible" insisted that the disease was malignant influenza.

The disease has probably been endemic in the area for many years; epidemics occurred in the periods 1917–22 and 1933–35.

Since 1941 many thousands of cases have occurred, and the present epidemic is the worst on record.

The authors in a recent investigation have found evidence that flea-borne typhus and tick-borne typhus occur in the territory, but the present epidemic is louse-borne. The spread of infection is attributed to the custom of visiting sick friends and relations. Under-nourishment plays a part by causing an increase in the virulence of the infection.

Inapparent attacks in children are also regarded as important factors in spreading the disease. Europeans, with the exception of doctors, nurses, and others who visit the sick, are rarely attacked.

It was at first believed that the reservoir of infection was in rats infected with murine Rickettsiae, but investigation directed to the confirmation of this hypothesis has led to the contrary conclusion. Several batches of rats and their fleas collected in the infected huts were found free from infection, whereas lice collected from infected kraals yielded strains of typhus in 9 cases out of 10. Both head lice and body lice were found to be infected.

The symptoms were of the usual type. The incubation period was usually 10 to 14 days, and seldom longer than three weeks. The rash could seldom be detected on the dark skins of the Bantu patients. In famine-stricken communities most of the patients, young and old, died.

Diagnosis was often impossible without the Weil-Felix test. Differentiation between the louse-borne and flea-borne infection could be effected by the Rickettsia-agglutination test and by the complement-fixation test, using the two types of Rickettsiae as antigens.

In five cases a complete series of tests was carried out. The results are shown in the table.

Table showing the Titres Observed in the Agglutination and Complement-Fixation Tests.

Pr.	*OX19*	*OX2*	*OXK*	Rickettsia Agglutination		Rickettsia Complement Fixation	
				R. prowazeki	*R. murina*	*R. prowazeki*	*R. murina*
(1)	6,400	25	50	1,600	50	1,600	200
(2)	100	25	50	1,600	100	1,600	400
(3)	1,600	25	25	200	50	1,600	400
(4)	800	25	50	100	25	400	50
(5)	1,600	50	50	100	50	102,400	1,600

In other cases the *Proteus OX2* titres were sometimes considerably higher than those shown above, but usually they were much lower than the *OX19* titres.

From the results of guineapig inoculation the authors conclude that, in general, all the strains are similar, and that they are typical strains of louse-borne Rickettsiae. [This is an interesting observation in view of the opinion of some workers that the South African strains of *R. prowazeki* are different from those of other countries in their antigenic properties.]

A " one-shot " vaccine prepared by alum precipitation of a murine vaccine of the Castañeda type was tried ; animal experiments and the results obtained in the field suggested that the method would be likely to have great value. *John W. D. Megaw.*

TOPPING, N. H. **Typhus Fever. A Note on the Severity of the Disease among Unvaccinated and Vaccinated Laboratory Personnel at the National Institute of Health.** *Amer. J. Trop. Med.* 1944, Mar., v. 24, No. 2, 57–62, 1 chart.

During the period 1929–1943 adequate observations were made in 14 cases of laboratory infection by typhus fever among the staff of the Typhus Unit of the National Institute of Health, U.S.A.

Seven of the patients had been vaccinated with yolk-sac vaccine, and seven were unprotected. The attacks in the latter group were typical and rather severe ; the duration of the fever ranged from 14 to 20 days and the Weil-Felix titre rose to 1–640 or over in all the cases.

In six of the seven vaccinated cases the fever lasted five to seven days ; in the case in which it lasted twelve days the patient had been vaccinated about four and a-half months previously with an early vaccine. In the vaccinated group the maximum Weil-Felix titre was much lower on the average ; in one patient it was 1–40, in another 1–80, and in still another 1–160 ; in the other four cases it ranged from 1–320 to 1–1,280. These titres were in striking contrast with those observed in the unvaccinated patients, in four of whom they were 1–20,480 or over.

The maximum complement-fixation titres in the vaccinated ranged from 1–512 to 1–16,348 ; this test was not carried out in the unvaccinated.

Both murine and classical strains of Rickettsiae were being used in the laboratory, and as the organism was isolated in only one case, in

which it was murine, it was not possible to classify the cases according to the strain of infection.

The virulence of the two strains in use remained constantly high through the whole period.

In four of the seven vaccinated patients the diagnosis of typhus fever would not have been considered on purely clinical grounds; the physicians in charge of the patients regarded them as suffering from "sinusitis," "streptococcus throat," "grippe," and "pneumonitis," respectively.

In three of the vaccinated patients repeated attempts were made to isolate the Rickettsiae by guineapig inoculation and yolk-sac cultures, but without success. These results suggested the possibility that vaccines may modify the infection to such a degree as to interrupt the louse-man-louse chain of transmission and so serve to control epidemics of the disease. *John W. D. Megaw.*

Shukov-Vereshnikov, N. N., Kolodeznaja, Z. E., Zaletaev, S. G. & Ibrazimova, N. V. [**The Clinical Features of Typhus in Patients who were injected with the Vaccine of Krontovskaja.**] *Sovetskaia Meditsina.* Moscow. 1943, No. 11/12, 16–18. [In Russian.]

An anti-typhus vaccine for mass use has appeared only very recently, but it has been already proved that patients injected with this vaccine develop a very much milder form of the disease. None of the six vaccinated patients observed by the authors showed a petechial rash. There is no negative phase in the post-vaccination immunity. The Weil-Felix reaction seems to become positive slightly sooner in vaccinated patients who develop the disease. The authors recommend that the vaccine of Krontovskaja be tried further during the incubation period, and in persons who are likely to come in contact with typhus. No statistics have so far been published, but it is possible that the vaccine diminishes the risk of infection. [No details of the preparation of the vaccine are given.] *H. W. Swann.*

Wohlrab, R. & Patzer, G. Die Infektiosität geimpfter und ungeimpfter Flecktyphuskranker. [**The Infectivity of Vaccinated and Unvaccinated Typhus Patients.**] *Münch. med. Woch.* 1944, Feb. 11, v. 91, No. 5/6, 57–9.

In a series of carefully conducted experiments the authors found no evidence of infectivity in lice which had fed on patients suffering from laboratory infections with typhus fever; they regard this negative finding as being due to previous inoculation with protective vaccines.

The investigation dealt with 18 cases of laboratory infection in vaccinated persons, and 26 control cases in unvaccinated persons whose infection was naturally acquired. Although the two groups were not strictly comparable the authors believe that the laboratory infections were likely to have been more virulent than the others.

Eight of the vaccinated patients had received specially intensive courses of Weigl's vaccine; their attacks were mild except for one case of average severity; the fever lasted 9·3 days on the average. The other ten had been treated by standard doses of an egg-yolk vaccine; three of them had severe attacks, the average duration was 11·4 days.

Among the unvaccinated patients fourteen had severe attacks, and the average duration of the fever was 14·5 days.

The *Proteus OX19* and Rickettsia-agglutination titres were lower in the vaccinated than in the unvaccinated; they were usually in proportion to the severity of the attacks, and so were lowest in the Weigl-vaccine group.

On each patient 200 clean laboratory-bred lice of about 14 days old were fed for one-half to one hour, twice daily, beginning as early as possible and continuing for 14 to 27 days. Smears were made from the faeces and guts of each batch of lice, and as soon as Rickettsiae were found some of the lice were examined histologically. All the lice surviving at the end of the experiment were examined for Rickettsiae. Some of the attacks occurred in vaccinated persons who were engaged in providing blood feeds for healthy lice; in their cases the same lice were allowed to continue to feed on them so that some of the experiments covered the incubation period as well as the febrile stage.

The findings were: *Rickettsia prowazeki* was found in 18 of the 26 unvaccinated persons; the eight negative cases occurred in January and February 1943. In the positive cases only 20 to 30 per cent. of the lice of each batch were infected; this low rate was probably due to the fact that feeding could not begin till the second week of the fever.

Rickettsiae were first found in the tissues of the lice on the eighth day of feeding and in the faeces they began to appear two days later.

In the vaccinated patients the feeding of the lice began within the first three days in most cases, sometimes even during the incubation period. In only one case a few Rickettsia-like bodies were found in one of a lot of five lice examined on the eighteenth day of feeding, but these bodies were not considered to be *R. prowazeki*.

It was, therefore, concluded that even the less effective yolk-sac vaccine in use at the time was capable of preventing transmission of infection through lice.

One fatal case, not in this series, is mentioned as having occurred in a patient aged 65 who had been vaccinated by Weigl's method; in this case lice did not become infected, and similar negative results are said to have occurred in two other severe attacks in vaccinated persons.

Vaccination may, therefore, turn out to be an effective means of controlling epidemics when conditions are unsuitable for the adoption of other methods of prevention. *John W. D. Megaw.*

BÜHLER, F. Zur Behandlung des Fleckfiebers mit Rekonvaleszentenblut. [**The Treatment of Typhus Fever with Convalescent Blood.**] *Münch. med. Woch.* 1944, Jan. 14, v. 91, No. 1/2, 5.

The author gives his general impressions of the effects of convalescent blood in the treatment of typhus fever.

In 1941–42 he observed a distinct improvement, after treatment with convalescent blood, in the condition of four patients who were suffering from severe attacks, and in 1942–43 he used the treatment when convalescent blood was available from patients whose blood groups were suitable, but instead of doses of 100 to 250 cc. he gave doses of 50 cc. on each of two days at intervals of one or two days.

The donors selected were young, otherwise healthy, persons, whose defervescence had occurred not more than 14 days beforehand and who

had not shown severe nerve or circulatory disturbances during the attack.

In all cases a distinct improvement was observed, especially in the headache and apathy, but the sudden and lasting benefit reported by HOFER v. LOBENSTEIN [*Münch. med. Woch*, 1943, v. 90, No. 7] was not obtained. The author agrees with this worker when he insists that the treatment is specially useful in the early stages of the fever.

Symptomatic treatment by strophanthin and "sympatol" is essential: the latter drug is of special value, it is given in doses of 20 minims four times daily from the outset. [Sympathol (synephrine) is a synthetic drug with an action like that of adrenaline.]

The author states that when he mentions a fall in the lethality rate among his patients from 15 per cent. in 1941–42 to only 2 per cent. in 1942–43 this must not be taken as implying that he regards the improvement as being due to the use of convalescent blood.

John W. D. Megaw.

DAVIS, W. A. & WHEELER, C. M. **The Use of Insecticides on Men artificially infested with Body Lice.** *Amer. J. Hyg.* 1944, Mar., v. 39, No. 2, 163–76, 1 fig.

As part of a programme for the control of typhus fever, the delousing of men by powders and sprays was studied. Pacifist volunteers working at a road construction camp were infested with body lice, observed till their infestation was increasing and then treated. The men wore uniform sets of underwear which was not washed or changed for three weeks. They were infested from a laboratory stock of lice by sewing on a patch of cloth carrying 100 lice as well as eggs at the back of the pants. Counts were made at two-day intervals; the average numbers fell and then rose to about 30–50 by the end of a week, when the treatments were applied.

Each powder tested was applied to the clothes of five men, using 30 gm. each. The numbers of lice usually dropped suddenly but with the exception of a few very effective powders, began to increase again as more lice hatched from eggs. Powders with pyrethrins, 2,4 dinitro-6-cyclo-hexyl phenol and 2,4 dinitro-anisole were most effective. [As almost all the powders were mixtures, the relative effectiveness of the several ingredients was not clear.] The most effective mixtures seem to be the following: No. 153, consisting of 0·6 per cent. 2,4 dinitro-6-cyclo-hexyl phenol, 0·1 per cent. pyrethrins and 0·5 per cent. n-isobutyl undecylenamide in pyrophyllite dust; and MYL [first adopted as the U.S. Army louse powder but later superseded; it contained pyrethrins 0·2 per cent., isobutyl undecylenamide 2 per cent., "phenol S" 1 per cent., anti-oxidant, and 2,4 dinitroanisole 2 per cent., in pyrophyllite. See this *Bulletin*, 1943, v. 40, 899].

Some tests were made with a spray containing 0·2 per cent. pyrethrins and 20 per cent. phenyl cellosolve in acetone. About 50 cc. was used, taking only a few minutes to apply. Results were moderately good.

No skin irritation was caused by any of the compounds mentioned in this abstract but the 2,4, dinitro-6-cyclo-hexyl phenol caused bright yellow staining of skin and garments. *J. R. Busvine.*

DAVIS, W. A., JUVERA, F. M. & LIRA, P. H. **Studies on Louse Control in a Civilian Population.** *Amer. J. Hyg.* 1944, Mar., v. 39, No. 2, 177-88.

The paper describes the development of an administrative technique for the use of louse-killing agents on civilian populations in Mexico. The ultimate aim of the work was to control typhus fever; the immediate purpose was to rid an entire town of lice cheaply, rapidly and with a minimum of equipment. First the co-operation of the people to be treated was sought (aids: prestige of uniformed workers from the Mexican Health Department, contact with influential citizens, explanation by public meeting, services of a clinician who dealt with miscellaneous diseases encountered, presents of soap, etc.). Then the town was mapped and a complete census taken. Teams of two (preferably a man and a woman) went round examining the head and clothing of every person, if possible. Brief records were made of the state of lousiness and both head and clothing were treated. The head was soaked with the following lotion, using about 8 cc. for a man and considerably more for a woman.

Phenyl cellosolve ...	1 part
Ethanol	2 parts
Water	2 parts
Methyl salicylate ...	trace to give odour.

For the clothing about 25 gm. of fine powder were applied mainly to the inner side of the garment next the skin. Flexible, transparent tubes, with a hole one end for puffing out powder, were useful. Three types of powder were used, the formula of the most successful not being disclosed. [It is believed to be: pyrethrins 0·2 per cent., iso-butyl undecylenamide 2 per cent., "phenol S" 1 per cent., dinitroanisole 2 per cent.] About 10 houses with 50 people were treated each day by each team.

A second application was made after a week and a final examination made after a month.

The trials were done in five small Mexican villages. In one of these typhus was epidemic and 64 per cent. of the population had body lice. Following treatment, the epidemic stopped and the number of lousy people in the second week was nearly nil. A month after the first treatment only 7 per cent. of the population had lice. *J. R. Busvine.*

PIROT, R. & BOURGAIN, M. Echec de la transmission expérimentale du typhus murin par broyat et déjections d'*Ornithodorus erraticus*. [**Failure to transmit Murine Typhus by Tissue Suspensions and Faeces of** *Ornithodorus erraticus*.] *Bull. Soc. Path. Exot.* 1943, Nov. 10 & Dec. 8, v. 36, Nos. 11–12, 326–30.

The authors found no evidence that Rickettsiae of murine typhus underwent development in the bodies of *Ornithodorus erraticus*, and therefore the conclusion was reached that these ticks were unlikely to play any part in the transmission of murine or epidemic typhus fevers.

The experiments consisted in feeding a number of healthy, pre-adult nymphal ticks, on three guineapigs infected with the P.F.X. Toulon strain of murine Rickettsiae. The feeds were on the first, second and fourth days of the febrile reaction. Pooled suspensions of the ticks were tested by intraperitoneal inoculation of four healthy guineapigs, but the suspensions failed to cause infection whether they were made

immediately after the feeds or at intervals of 7, 33 or 63 days. In all cases the guineapigs used were later found to be susceptible to the same strain of Rickettsiae.

Faeces of ticks which had fed in the same way were collected 10 and 155 days afterwards; they failed to cause an immunizing infection in any of the guineapigs which were inoculated with them, though in some cases there were irregular rises of temperature.

John W. D. Megaw.

Ahlm, C. E. & Lipshutz, J. **Tsutsugamushi Fever in the Southwest Pacific Theater.** *J. Amer. Med. Ass.* 1944, Apr. 15, v. 124, No. 16, 1095–100, 3 figs. [Refs. in footnotes.]

Tsutsugamushi fever ("dangerous bug fever") has also been called by such names as Sumatran typhus, K typhus, scrub typhus, kedani disease, and pseudo-typhoid fever of Deli.

The report deals with 70 cases, most of which occurred among troops engaged in clearing a densely wooded area of half a square mile. The rainfall of the area is heavy; rodents and their mites are abundant. Localities with scrub and dense damp jungle were most heavily infected. The occurrence of the cases was of the "endemic" type.

Species of *Trombicula* mites were found on the ears and genitals of field rats and mice in the affected area.

Some of the clinical features were: The primary ulcer was found on the scrotum (16 cases); the ankle (10 cases); the inguinal region (9 cases); and the thigh (8 cases). In 23 cases no ulcer appears to have been found. In nearly all the patients there was adenitis of the inguinal region; this appeared three or four days after the onset.

The temperature rose steadily, reaching 104 to 105°F. after 10 days. About the seventh or eighth day a macular erythema appeared on the face, chest and abdomen. In six cases there was no rash, and in four it was slight.

In about 67 per cent. of the cases there were severe atypical signs of pneumonia, with dry cough, scanty sputum, and dyspnoea. In 20 per cent. a "virus-like" pneumonia was revealed by X-ray examination.

Abdominal distension with nausea and vomiting occurred in 60 per cent. of the cases. The temperature fell by lysis, and convalescence was slow, the average period of incapacitation being not less than 100 days. Only one of the patients died.

The leucocyte picture gave little help in diagnosis; the total count ranged from 1,400 to 14,250; it exceeded 9,000 in only 4 of the 55 cases in which the data were available. An appreciable number of the patients had leucopenia with relative lymphocytosis.

The *Proteus OXK* reaction became positive "about the second week." From the table it appears to have been negative in 5 of the 59 cases tested, and the titre was 1–40 or 1–80 in 16 cases. In most of the others it rose to 1–640 or over. Nearly all the patients whose titres were low had no primary ulcer.

The general features of the disease appear to have conformed to the typhus pattern.

The authors' views on treatment are conservative; convalescent serum was regarded as risky, sulphonamides were found ineffective in the cases with pneumonic signs. Plenty of fluids by the mouth, fruit juices, sodium chloride tablets, vitamin-B complex, and multivitamin

tablets, were found useful. Sedatives and encouraging suggestion were valuable in allaying anxiety and restlessness.

The authors point out that the disease constitutes a serious military problem, because of the prolonged incapacitation that it causes, and also because there may be a high rate of mortality.

Suggestions for prevention include : the use of indigenous labour for clearing and burning grass and vegetation on sites that are to be used as camps ; avoidance of sleeping on the ground ; spraying camping grounds with petroleum emulsion ; treatment of socks and the lower parts of trousers with repellents ; and dusting the body with equal parts of sublimed sulphur and talcum.

[This report confirms the view held by British and Australian military medical officers that mite-borne typhus is a major military problem in the East.

Throughout the Pacific region and the south-eastern area of Asia, including India and Ceylon, an attitude of watchful suspicion is essential when troops are operating in scrub, jungle, and open country.

Although the disease ordinarily occurs in sporadic form there may be large outbreaks among troops entering areas of intense infection, and a serious degree of incapacitation of the personnel is a possibility.]

John W. D. Megaw.

BARTONELLOSIS.

JARAMILLO, J. R. Contribución al estudio de la Bartonellosis en Colombia. (Enfermedad de Carrión.) [**Bartonellosis in Colombia.**] *Medicina.* Bogota. 1943, June, v. 5, No. 54, 158–82.

The author has studied a disease rife in Sandoná, Nariño Department, at one time thought to be typhoid fever, but which he shows was Carrión's disease. The present article is based on a study of over 200 cases. The outbreak first appeared in a rural area of the Department in 1935 and later spread to other districts, particularly the valleys of the Guaítara, Juanambá and Mayo rivers. The author describes the two forms, Oroya fever and Verruga peruviana. The prognosis in the former is grave. ROCHA-LIMA gives it as 98 per cent. fatal, STRONG as 38–40 per cent. ; the latter the author finds to hold good for cases in the local hospital. He then gives details of 10 patients ; five died, the rest recovered. In one of the latter the red cells were as low as 500,000 per cmm. with *Bartonella* in every corpuscle. Improvement was noted immediately after a blood transfusion. Pain, vomiting and diarrhoea ceased and *Bartonella* were hard to find. A second transfusion was given three days later and cure followed rapidly. Previous injections of acridine and campolon had done no good at all.

Thirteen cases of the verruga form are also described ; all recovered. Injections of Fouadin, in doses of 1·5 to 5 cc. intravenously or intramuscularly benefited some, but the best results were obtained with intravenous injections of cyanide of mercury, 0·01 cgm. on alternate days for five or six injections and one or two more after an interval of ten days. [In foreign papers " 0·01 cgm." sometimes means 0·01 gm. ; whether this is implied here or whether it means 0·0001 gm. is not certain, as the mode of preparing it is not described, nor the solvent used. In all but two instances 0·01 cgm. is mentioned ; in the two exceptions the dose is stated as 0·10 cgm.] *H. Harold Scott.*

YELLOW FEVER.

BATES, M. & WEIR, J. M. **The Adaptation of a Cane Rat (Zygodontomys) to the Laboratory and its Susceptibility to the Virus of Yellow Fever.** *Amer. J. Trop. Med.* 1944, Jan., v. 24, No. 1, 35–7.

The authors have been successful in establishing a breeding colony of 50 female and 35 male cane rats, *Zygodontomys microtinus* near *stellae* Thomas, from which they get 50 to 80 young per month. The gestation period of this species is about 28 days, they reach sexual maturity in three to four months and the average litter is about four.

Attempts were made to infect this species with yellow fever virus, using two local (Colombian) strains and also a neurotropic strain. Subcutaneous and intraperitoneal inoculations into 14 cane rats produced no signs of infection and attempts to recover virus at intervals between four and seven days after the inoculation were all negative. The virus seems to grow readily in brain tissue, after intracerebral inoculation, but only about half the animals died of the infection. The " French neurotropic " strain was carried through 12 intracerebral passages in these animals and showed some signs of adaptation, since the mortality became higher and the incubation period shorter.

Protection tests with the blood of animals that had been inoculated, either subcutaneously or intraperitoneally, showed that circulating antibodies were developed, as well as after intracerebral inoculation.

E. Hindle.

LAEMMERT, H. W., Jr. **Susceptibility of Marmosets to Different Strains of Yellow Fever Virus.** *Amer. J. Trop. Med.* 1944, Mar., v. 24, No. 2, 71–81, 1 fig. [11 refs.]

The author has studied the susceptibility to various strains of yellow fever virus of three species of marmosets, *Callithrix leucocephala* (E. Geoff.), *C. jacchus* (L.) and *Leontocebus rosalia* (L.). The virus employed included two African strains, the Asibi and French, and seven South American strains. All the marmosets were inoculated subcutaneously with infective monkey serum, and the number of M.L.D.'s were estimated by intracerebral tests in white mice.

In the case of *Callithrix jacchus* (L.), 172 animals were tested and the mortality with different strains of yellow fever virus is shown in the table on page 748.

Somewhat similar results were obtained with 35 *Leontocebus rosalia* inoculated with two African and two South American strains. In these two species, inoculation with the Asibi or French strains was not, in general, fatal, but the virus circulated in the blood and neutralizing antibodies developed. Most of the South American jungle strains, however, were highly lethal for these species.

On the other hand, in the case of 22 *Callithrix leucocephala* similarly tested, fatal infections were produced not only by the jungle strains but also by the Asibi strain, the only African strain tested. The average survival time of animals infected with the Asibi strain was seven days, whilst five inoculated with jungle strains died on the fourth to the sixth days of infection. In all cases circulating virus was present, generally appearing within 24 to 48 hours and persisting until death.

Mortality of Callithrix jacchus *inoculated with different Yellow Fever Strains*

Number of Marmosets inoculated	Virus								Results
	Strain	Number of passages in rhesus	Range of MLD of virus inoculated	Died of yellow fever		Survived			Yellow Fever fatality rate
				Number	A.S.T.*	Number	Number immune	Nonspecific deaths	
16	Asibi	39 to 43	1×10^0 to $1{\cdot}1 \times 10^5$	0	8	13	12	3	0/12 (0 p.c.)
16	Asibi	17	6×10^1 to 6×10^5	3	5·6	12	11	1	3/14 (21 p.c.)
22	French	±17	2×10^0 to $1{\cdot}5 \times 10^5$	5	6·0	14	13	3	5/18 (28 p.c.)
22	J.Z.	3 to 5	1×10^0 to $6{\cdot}6 \times 10^4$	20	7·5	2	2	0	20/22 (91 p.c.)
18	O.C.	1 to 5	3×10^1 to $2{\cdot}7 \times 10^4$	15	8·1	3	2	0	15/17 (88 p.c.)
15	J.F.	11	2×10^2 to 1×10^5	7	9·0	5	5	3	7/12 (58 p.c.)
12	M.A.J.	21	$1{\cdot}2 \times 10^2$ to $1{\cdot}2 \times 10^5$	9	7·0	3	3	0	9/12 (75 p.c.)
14	A.C. Bol.	1	$4{\cdot}8 \times 10^1$ to $4{\cdot}8 \times 10^4$	11	9·3	1	1	2	11/12 (92 p.c.)
13	Martinez	3	$3{\cdot}5 \times 10^1$ to 5×10^3	3	6·6	5	5	5	3/8 (38 p.c.)

* A.S.T. = Average survival time.

Specific gross and microscopical lesions were found in all three species after fatal infection with the virus. The degree of liver necrosis varied from one case to another but in *L. rosalia* nearly 40 per cent. showed a greater concentration in the mid-zone, whereas in the other two species the necrosis was evenly distributed throughout the lobule and it was exceptional to find any marked mid-zonal necrosis. Intranuclear inclusion bodies were found in the livers of *C. jacchus* infected with certain jungle strains, although as a rule these strains do not produce such bodies in *rhesus* monkeys.

Marmosets which survived infection with any of the African or South American strains developed a humoral immunity.

E. Hindle.

BATES, M. **The Saimiri Monkey as an Experimental Host for the Virus of Yellow Fever.** *Amer. J. Trop. Med.* 1944, Mar., v. 24, No. 2, 83–9, 2 figs.

A total of 19 squirrel monkeys, *Saimiri sciureus caquetensis* Allen, collected in the neighbourhood of Villavicencio, where this animal is very common, were infected with various strains of yellow fever virus either by direct inoculation or by means of infected mosquitoes, *Haemagogus capricorni*.

With one doubtful exception, in all cases virus was recovered from the circulation, the maximum titre ranging from 1 : 100,000 up to more than 1 : 1,000,000.

In a series of 14 infections, mainly with a local strain, the " Novoa " virus, but including other strains, five died within 10 days under circumstances suggesting that the virus was the cause of death. It is of interest, however, that this species can be infected by doses of virus too small to be detected by the usual method of intracerebral inoculation into white mice. Although fatal infections show some pathological changes in the liver, in only one case were they characteristic of yellow fever. Antibody production may be very weak, corresponding to a dilution of 1 : 64 of immune rhesus serum, but there is no evidence of " false positive " reactions.

The author gives some notes on the taxonomy and habits of *Saimiri* monkeys and discusses the possibilities of their use for the laboratory study of yellow fever. The main objections are their small size; the toxicity of their serum for white mice; the uncertainty of working with animals that may have been exposed to natural infection; and also the high degree of helminth parasitism. Almost all wild specimens were found to be infected with an Acanthocephalid worm, *Prosthenorchis elegans*; nematodes, probably *Filaroides* sp., were nearly always present in the lungs, and another nematode, *Dipetalonema gracile*, is sometimes found in the peritoneal cavity; in addition a trematode, *Athesmia foxi*, is frequently found in the liver.

E. Hindle.

BATES, M. **Experiments with the Virus of Yellow Fever in Marsupials, with special reference to Brown and Grey Masked Opossums.** *Amer. J. Trop. Med.* 1944, Mar., v. 24, No. 2, 91–103, 3 figs. & 1 diagram. [13 refs.]

The author has extended the study by BUGHER *et al.* [see this *Bulletin*, 1941, v. 38, 434] on the susceptibility of marsupials to yellow fever virus.

The taxonomy of these opossums is a matter of some difficulty and photographs of three of the common species are given. These include the Grey Masked Opossum, *Metachirops opossum* Allen, the Brown Masked Opossum, *Metachirus nudicaudatus* Allen, and the Woolly Opossum, *Caluromys laniger* Bangs. In the paper by Bugher *et al.*, referred to above, *Metachirops* is called *Philander*, whilst in a previous paper by Bugher (1940), the name *Philander* is used for *Caluromys*.

The virus of a Colombian ("Novoa") strain of yellow fever was maintained in the Brown Masked Opossum, *Metachirus*, for 10 consecutive passages by intramuscular inoculation of serum. Since the animals showed no obvious signs of infection they were bled uniformly on the fourth day for passage, since other tests had shown that virus was most often circulating on this day. The virus content of the serum used for inoculation was estimated by means of protection tests in white mice. There was no apparent increase in virulence or infectivity for the Brown Masked Opossum, or for the Grey Masked Opossum in the course of these passages. The virus seemed equally infectious for Squirrel monkeys both before and after the serial passages.

Various other strains of yellow fever virus were inoculated into the Brown Masked Opossum and circulating virus was recovered from 34 out of 47 animals.

The closely related Grey Masked Opossum, *Metachirops*, gave very different results, and circulating virus was recovered from only one of 28 animals inoculated, or including BUGHER's experiments, 4 out of 43 animals.

Brown Masked Opossums, which failed to show circulating virus after inoculation, were sometimes positive after a second inoculation of the same or different strains. Antibody response as measured by the intracerebral protection test was usually regular in this species, but a few sera seemed to give "false reactions" and others failed to show any protective power even after circulating virus had been present.

The results of intracerebral protection tests with the sera of the Grey Masked Opossum seemed to bear no relation to any exposure of the animals to yellow fever virus, but the serum was highly toxic for mice when inoculated intracerebrally, killing about 40 per cent. The serum of the Brown Masked Opossum does not show this toxic property.

From these experiments it is difficult to form any opinion as to the importance of these marsupials in the epidemiology of jungle yellow fever. The amount of virus in circulation rarely exceeded a titre of 1 : 1,000, whilst in transmission experiments with *Haemagogus* fed on Squirrel monkeys, a minimum titre of 1 : 100,000 was necessary for the infection of this mosquito. *E. Hindle.*

TURNER, R. H., SNAVELY, J. R., GROSSMAN, E. B., BUCHANAN, R. N. & FOSTER, S. O. **Some Clinical Studies of Acute Hepatitis occurring in Soldiers after Inoculation with Yellow Fever Vaccine ; with especial consideration of Severe Attacks.** *Ann. Intern. Med.* 1944, Feb., v. 20, No. 2, 193–218. [21 refs.]

The authors had the opportunity of studying 4,083 cases of hepatitis following the inoculation of icterogenic yellow fever vaccine in U.S. Army personnel [see this *Bulletin*, 1943, v. 40, 40].

The cases all occurred within a period of four months and the period between inoculation and onset of the disease was 9 to 23 weeks. About half occurred during the fourth month after inoculation.

The clinical picture and laboratory findings were on the whole similar to those described by others in patients receiving icterogenic yellow fever vaccine or icterogenic human serum. The authors classed as severe those cases in which the attacks lasted more than 80 days, with icterus indices reaching 120 or higher, and, in some instances, a marked loss of weight. These comprised about 2 per cent. of all cases. Petechial haemorrhages and anaemia, usually macrocytic, occurred in most of the severe cases. There were 14 fatal cases among the 4,083, a slightly higher percentage than usually found. All the patients who died had evidence of dysfunction of the nervous system before death. The authors observed four subjects who showed, during convalescence or after apparent recovery, a slow coarse tremor of the extremities; they suggest that the tremor has the same cause as that seen in the syndrome of hepatolenticular degeneration. Ascites was seen in 13 patients. Five of these died and eight apparently recovered.

In making a prognosis, it was found that the rate of correction of prolonged prothrombin clotting after vitamin K therapy was the best single guide. Daily examination of morning specimens of urine, meal by meal check of the kind and amount of food taken (anorexia, subject to diurnal variations, is regarded as the most important symptom of the disease), and daily records of body weight were found highly useful in the early detection of changes in the course of the disease. The importance of sufficient rest during the illness and convalescence is stressed. The routine diet used was high in carbohydrate and protein and low in fat. The authors consider that regularity and frequency of food intake are probably of greater importance than exactness of the composition of the diet. Vitamin supplements did not seem to influence recovery. Group studies failed to show beneficial effects from the use of methionine and choline. *F. O. MacCallum.*

Soper, Fred L., Wilson, D. Bruce, Lima, Servulo & Antunes, Waldemar Sá. **The Organization of Permanent Nation-Wide Anti-*Aëdes aegypti* Measures in Brazil.**

This book was reviewed on p. 699.

DENGUE.

Kisner, P. & Lisansky, E. T. **Analysis of an Epidemic of Dengue Fever.** *Ann. Intern. Med.* 1944, Jan., v. 20, No. 1, 41–51.

The authors give an analysis of the signs and symptoms of 318 cases of dengue fever in the army personnel of a coastal town in an island in the South-Pacific area during March and April 1943.

The incidence of the chief features was as follows; the figures in brackets refer to percentages: Sudden onset (93·7); chilliness (31·8); flushed face and reddened eyes (26); definite rash, variable in time and site of appearance, but usually a blotchy erythema most pronounced on the chest (37); saddle-back fever curve, including cases with a period of normal temperature between the two spells of fever (66); one-phase fever curve (29·5); various aches and pains (99), including, frontal headache (69), backache (43·5), and pain in or behind the eyeball (25); relative bradycardia after the first day or two (97); adenopathy,

usually of posterior or lateral cervical glands (17); leucopenia, between the second and fifth days and with Schilling shift to the left (100); pronounced lymphocytosis of over 40 per cent. (7); hyperaesthesia (6·28); abdominal pain, rarely severe (6·6); insomnia (5·6); nausea (5); photophobia (4·7); perversion of taste (3·8); diarrhoea (3·1); itching (3·1); vomiting (2·5); cyanosis (1·6); numbness and tingling of arms and legs (1·25).

The various combinations of rash and type of fever curve were :—

Saddle-back curve	*Rash*	
Present	Absent	41·72 per cent.
Present	Present	24·21 „ „
Absent	Absent	21·06 „ „
Absent	Present	12·89 „ „

The relative frequency of cases in which both the rash and the two-phase fever curve were absent is noteworthy, so also is the number of cases without rash.

Convalescence lasted from two to over three weeks; mental depression was of frequent occurrence, but it is stated that the clinical course was relatively mild. *John W. D. Megaw.*

ZELIGS, M. A., LEGANT, O. & WEBSTER, E. H. **Epidemic Dengue; its Abortion in a Combat Area.** *U. S. Nav. Med. Bull.* 1944, Apr., v. 42, No. 4, 856–60, 2 figs.

The authors claim to have demonstrated the feasibility of carrying out effective measures of control of dengue, even under the limitations imposed by military operations.

The report deals with cases in a South-Pacific island, referred to as X, in which the men were exposed to great risk of infection, because of frequent visits of aviators from Island Y, 450 miles distant, where dengue was occurring in epidemic form, and because of the abundance of *Aëdes aegypti*.

Seven men who had flown from Island Y on July 14th and 19th, 1943, reported sick between July 22nd and 24th and were diagnosed as cases of dengue. The first case in Island X occurred on July 27th.

Rigorous measures of control were at once adopted; these were: (1) The sick were segregated in a screened camp in an area free from *Aëdes aegypti* and were kept strictly under mosquito curtains during the first five days of the fever. (2) Men in the area from which the patients had come were checked twice daily, their quarters were sprayed with insecticide; full clothing, the application of a repellent to the exposed parts of the body, and the use of mosquito curtains, were ordered. (3) Shirts and full-length trousers were worn by all personnel on the island and everyone was warned to report immediately any illness, however slight. (4) A thorough campaign of mosquito control was carried out all over the island, the interior and cargo of all visiting planes were sprayed and their personnel were kept under close observation.

An initial outbreak occurred on Island X; 27 persons were attacked between July 26th and August 7th, but although infected persons arrived on several occasions from Island Y between August 9th and August 31st there were only two more cases among the troops stationed in Island X.

Among the special clinical features of the attacks the following are of interest: Lymphadenopathy, especially of the posterior cervical glands, occurred in 90 per cent., conjunctivitis in 75 per cent., pharyngeal lymphoid hyperplasia in 65 per cent., palpable spleen in 25 per cent., and a rash in 40 per cent. of the cases.

John W. D. Megaw.

PLAGUE.

Jawetz, E. & Meyer, K. F. **The Behaviour of Virulent and Avirulent *P. pestis* in Normal and Immune Experimental Animals.** *J. Infect. Dis.* 1944, Jan.-Feb., v. 74, No. 1, 1–13, 1 chart. [16 refs.]

Strong support has been forthcoming for vaccines of living avirulent organisms rather than of dead organisms. But it is not every avirulent organism which is at the same time immunogenic. This character has indeed to be proven before the organism in question can be successfully used. Live plague vaccines have now been used on a large scale. With elaboration of a sensitive technique a comparison has been instituted by the authors of the behaviour of virulent and avirulent *P. pestis* respectively, after subcutaneous or intracutaneous inoculation in mice, guineapigs and rats. The distribution of the two types of organism does not differ except quantitatively. Avirulent strains, however, as has been frequently described, may differ in their power of producing immunity according to the test animals. It is argued that as these avirulent strains are still " distributed equally and persist for the same length of time in the different host animals " the immunogenic activity cannot be correlated with invasiveness or survival in the body and must be dependent on antigenic constitution. In actively immunized guineapigs and mice the distribution of inoculated virulent organisms was found to be much the same as in non-immunized animals, but the bacilli disappear in due course from the former and in the following order: blood stream, liver and spleen, regional lymph nodes and local lesions. On the other hand proliferation, not disappearance, took place in non-immunized animals. Another similarity found to exist between the behaviour of virulent and avirulent bacilli was that the cumulative mortality curve obtained with a small subcutaneous dose of the former resembled that with a large toxic dose of the latter. Survival in the body of avirulent organisms appeared to be longer in the brain tissue of mice after intracerebral injection than if administered in any other way. The pathological lesions produced by virulent and avirulent organisms are also contrasted.

W. F. Harvey.

McMahon, Margaret C. **Susceptibility of the Golden Hamster, *Mesocricetus auratus*, to Plague.** *Pub. Health Rep.* Wash. 1944, Feb. 18, v. 59, No. 7, 234–6.

Natural infection of the hamster (*Cricetus cricetus*) was reported in south-eastern Russia in 1926, and *artificial* infection only of three

species *Cricetulus barabensis griseus*, *Cricetulus barabensis barabensis* and *Cricetulus eversmanni*. Apparently trials of susceptibility have not been made with the golden hamster (*Mesocricetus auratus*) and this is the subject of study by the author. The inoculations of the hamsters were subcutaneous, intracutaneous or intraperitoneal in doses of two million to three billion [*i.e.* 3000 million] organisms, with appropriate mice and guineapig controls. All animals were autopsied. Of 12 mice inoculated all died of plague. Twenty-nine out of 30 guineapigs died of plague but only 15 of the 48 hamsters used. Serological tests and protection tests were also carried out with the surviving hamsters. "These results indicate that the golden hamster is not a suitable animal for routine use as a test in the diagnosis of plague . . . , is highly resistant to plague infection when compared with other test animals, but does not exhibit a natural immunity as determined by serological methods." *W. F. Harvey.*

BACILLARY DYSENTERY.

JAMIESON, W. M., BRODIE, J. & STIVEN, D. **Bacillary Dysentery in Dundee. A Comparative Study of Treatments.** *Brit. Med. J.* 1944, Mar. 4, 322–4.

The value of sulphaguanidine in obtaining clinical and bacteriological cure in bacillary dysentery was assessed by comparison with saline aperients and a chalk mixture in a total of 200 cases (100 treated with sulphaguanidine; 50 with saline aperients; and 50 with chalk mixture). Most of the cases were children under 12 years of age. The infecting organism was *Bact. flexneri* or the *newcastle* variant in 75 per cent., *Bact. sonnei* in 20 per cent. and "mixed" in 5 per cent., and the infection was not as a rule severe, 47 per cent. having blood and mucus in the stools. Dosage of sulphaguanidine, based on age, varied from 14 to 62 gm. over five days. Quantitative estimation of the drug in faeces showed levels varying from 450 to 13,000 mgm. per cent. The average duration of symptoms, that is until stools became normal, was 5·0 days for sulphaguanidine, 6·0 for chalk and 6·5 for aperients. Bacteriological cure was based on three consecutive negative faecal cultures from the time the patient became clinically well, using the special solid and fluid media devised by BRODIE [see *Bulletin of Hygiene*, 1943, v. 18, 158]. On this basis, sulphaguanidine-treated cases had a 70 per cent. cure compared with 50 per cent. for aperients and 48 per cent. for chalk. The results in the sulphaguanidine series were better in the Flexner and Newcastle than in the Sonne infections. Of the total positive specimens in convalescence 36 per cent. were positive only after enrichment in selective broth medium, while in the sulphaguanidine series 46·6 per cent. of the positive results occurred with this enrichment. Thus, if direct plating only had been used, the convalescent carrier rate in the sulphaguanidine series would have been 19 per cent. compared with 38 per cent. and 46 per cent. in the aperients and

chalk series respectively. A comparison was not made of the *duration* of the carrier state associated with the different treatments.

Robert Cruickshank.

i. Scadding, J. G. **Comparative Effects of Sulphonamide Drugs in Mild Bacillary Dysentery.** *Lancet.* 1944, June 17, 784–6.

ii. Boyd, J. S. K. **Bacillary Dysentery.** [Correspondence.] *Ibid.* July 15, 90.

i. The author investigated the relative efficacy ofsulphaguanidine, sulphapyridine and sulphanilamide in the treatment of 358 mild cases of dysentery admitted to a desert base hospital in the Middle East during the summer of 1943. It was not considered justifiable to leave any cases untreated to serve as controls. New admissions to the hospital were treated in rotation with one of the three drugs for a period of 48 hours, the following dosage being used: sulphaguanidine, 7·5 gm. followed by 2·5 gm. three-hourly; sulphapyridine, 3 gm. followed by 1 gm. three-hourly; sulphanilamide, 3 gm. followed by 1 gm. three-hourly. The total doses given during the 48 hours were 47·5 gm., 19 gm., and 19 gm. respectively.

Cultures were made from 34 patients, dysentery bacilli being isolated from 16; the varieties were, Shiga, 6, Sonne, 4, Flexner, 3, and unidentified, 3.

It happened that the drugs were not given in strict rotation and so more patients received sulphaguanidine than either of the other two drugs. The data, including criteria of clinical severity and of the results of treatment are shown in the table on p. 756.

Conclusions.—The three sulphonamide drugs are equally beneficial in mild bacillary dysentery; sulphaguanidine has the advantage of great freedom from unpleasant side-effects, while sulphapyridine is liable to cause serious renal disorder.

ii. The author opposes the view, expressed by Scadding and in other recent articles on the treatment of bacillary dysentery, that the disease in the Middle East is now of a mild type. If that view were accepted it might give the impression that the efficiency of treatment by sulphonamides had not been clearly shown and that cases would probably have recovered equally well without it. Those doctors who had to treat the disease in the Middle East before sulphonamides were available, saw a proportion of severe cases, many of the patients remaining incapacitated for a long time and some dying in spite of receiving every form of treatment then known. Such severe cases were common in the Middle East Force in the latter part of 1940. When sulphaguanidine was received (towards the end of 1940), it was tried out first on subacute cases of long standing which had resisted all treatment. The results were dramatically successful in these cases and in other types of case and "from that time onwards dysentery lost its terrors"; when a sufficient supply of the drug became available the grave type of the disease was rarely seen.

The author thinks that the mildness of Scadding's cases was due to early treatment with sulphonamides and not to a change in virulence of the infecting organism; 18·86 per cent. of dysentery bacilli identified during three years in the Middle East were *B. dysenteriae* Shiga.

Analysis of Cases.

	Group 1 June–Nov.			Group 2	
	Sulphaguanidine 47·5 gm. in 48 hr.	Sulphapyridine 19 gm. in 48 hr.	Sulphanilamide 19 gm. in 48 hr.	Sulphaguanidine July–Nov. Varying dosage	Sulphanilamide May–June 19 gm. in 48 hr.
Cases—Total ...	117	76	81	50	34
Bacillary exudate*	83(71)	60(79)	59(73)	37(74)	27(79)
Indefinite exudate†	34(29)	16(21)	22(27)	13(26)	7(21)
Severity—					
Average duration before admission (days)	2·0	2·2	2·2	3·5	2·7
Average number of stools in day before admission	14	14	13	13	15
Febrile percentage...	73	64	65	60	71
Average maximum temperature recorded :					
All cases ...	100	99·6	99·9	100·1	100·3
Febrile cases ...	100·5	100·2	100·7	101·2	101
Av. duration after admission (days) ...	1·2	1·3	1·7	1·3	1·5
Results					
Average day after admission on which stool first formed ...	4·8	4·1	4·4	5·0	4·6
Average days in hospital	11·2	9·3	9·9	10·5	8·7
Cases given further treatment ...	11	1	3	—	nil
Complications of treatment	nil	vomiting 4 ; haematuria 1	nil	nil	Rash, 1

Percentages in brackets.

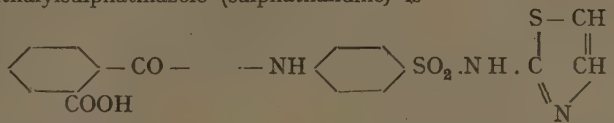
*Bacillary exudate. Contains more than 50 per cent. of polymorphonuclear neutrophiles.

†Indefinite exudate. Contains less than 50 per cent. of polymorphonuclear neutrophiles.

It was considered unjustifiable to withhold the drug from patients for the purpose of making controlled experiments, but the mildness of Scadding's cases demonstrates the efficiency of sulphonamide treatment. *J. F. Corson.*

POTH, E. J. & ROSS, C. A. **Bacteriostatic Properties of Sulfanilamide and some of its Derivatives. II. Phthalylsulfathiazole, a New Chemotherapeutic Agent locally Active in the Gastroenteric Tract.** *Texas Reports on Biol. & Med.* 1943, v. 1, No. 4, 345–70, 8 charts. [17 refs.]

Phthalylsulphathiazole (sulphathalidine) is



Phthalyl Sulphathiazole

Like succinyl sulphathiazole it slowly liberates sulphathiazole in the lumen of the bowel. It is practically insoluble in water but the sodium salt is moderately alkaline. It has two to four times greater bacteriostatic activity than succinyl sulphathiazole as indicated by the effect on coliform organisms in the alimentary canal of the dog. Doses of 0·25 gm. per kgm. per day cause profound diminution in the number of coliform organisms present in the faeces (sometimes proceeding to complete elimination). The compound is sparingly absorbed when given by mouth, and so its toxicity by oral administration is low. There was no sign of toxicity when dogs were given 0·08 gm. per kgm. every four hours for six weeks. With twice this dose, the maximum concentration of the conjugated (intact) drug in the blood is less than 3·3 mgm. per 100 cc. When given to dogs by intraperitoneal injection the LD 50 (dose killing half the animals) is 2·5 gm. per kgm. After parenteral injection, the drug is excreted into the bowel, *via* the bile, in amounts sufficient to produce a bacteriostatic effect. Phthalylsulphathiazole is less likely to form liquid stools than succinyl-sulphathiazole. Accordingly it will probably be more effective than the latter in the presence of diarrhoea and in the treatment of dysentery. The results of clinical trials will be reported later.

[The observations recorded in this paper closely resemble those described by KIRCHHOF, RACELY, THOMPSON & DAVID, *Bulletin of War Medicine*, 1944, v. 4, 607, which should be consulted for greater detail.] *F. Hawking.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

NOTH, P. H. & HIRSHFELD, J. W. **Amebic Abscess of the Liver with Secondary Infection. Local Treatment with Penicillin.** *J. Amer. Med. Ass.* 1944, Mar. 4, v. 124, No. 10, 643–6, 4 figs. [Refs. in footnotes.]

A long-standing amoebic abscess of the liver, secondarily infected with *Strep. pyogenes* of Group G, was treated by introducing penicillin solution into the abscess cavity through a ureteric catheter kept *in situ*. This process was continued at intervals of four hours for 15 days, the dose being reduced from 25,000 units initially to 5,000 units during the second week: 830,000 units in all were used. The abscess was sterilized and the patient recovered. *L. P. Garrod.*

FAUST, E. C. **Some Modern Conceptions of Amebiasis.** *Trans. & Studies of College of Physicians of Philadelphia.* 1943, Dec., v. 11, No. 3, 101–13, 1 fig. [77 refs.]

RACHMILEWITZ, M. **Amoebic Hepatitis.** *Acta Med. Orientalia (Palestine & Near East Med. J.).* 1944, Mar.–Apr., v. 3, No. 2, 35–9.

TREU, R. **Giardiasis.** *Indian Med. Gaz.* 1944, Feb., v. 79, No. 2, 58–61.

In this paper the author discusses giardiasis as he has encountered it in his practice in India. He thinks that the condition is frequently overlooked, owing to the inadequacy of descriptions in the text-books. He considers that in every case of abdominal discomfort, flatulence, diarrhoea, steatorrhoea and dysentery, giardiasis should be regarded as a possible cause. The infection may be of three types, *viz.*: infection without symptoms, heavy infection of the colon, infection of the small intestine. It is found that patients having symptoms of various kinds, including dysentery with passage of blood and mucus, are cured or relieved by mepacrine (atebrin) without eradication of the infection. [One is led to wonder why, if this is the case, the flagellate is regarded as the cause of the many and varied symptoms described. In fact, the author fails to recognize what is known of the habitat of the flagellate in the intestine, and the real function of its cysts. It is certainly not a tissue invader, like *Entamoeba histolytica*, it does not live and multiply in the colon, and so can hardly be responsible for dysenteric symptoms with passage of blood and mucus.] *C. M. Wenyon.*

RELAPSING FEVER.

COLAS-BELCOUR, J. & CHORINE, V. Sur une souche tunisienne d'*Ornithodorus erraticus* Lucas réfractaire à l'infection par *Spirochaeta hispanica* Sadi de Buen, dont cet Argasiné est le vecteur naturel. [**A Tunisian Strain of *O. erraticus* Refractory to Infection with *S. hispanica*, of which this Tick is normally a Vector.**] *C. R. Acad. Sci.* 1944, July 5, 12, 19 & 26, v. 217, Nos. 1, 2, 3 & 4, 35–6.

A female *Ornithodorus erraticus*, captured in Tunisia, was found to be completely resistant to infection with *Spirochaeta hispanica*; its progeny also were quite resistant at all stages of their development. Feeding experiments and inoculation of ground-up bodies of the ticks, after they had fed on infected guineapigs, failed to produce infection while other ticks of the same species, used as controls, transmitted the infection. This Tunisian strain of *O. erraticus* has been maintained in the laboratory for nearly 12 years and has been kept specially for experiments with animals infected with *S. hispanica*. The authors regard the resistance as comparable with certain forms of natural immunity of a racial character such as occurs in *Culex pipiens* for bird malaria [see HUFF, this *Bulletin*, 1930, v. 27, 892] and in *Aëdes aegypti* for *Dirofilaria immitis* [see ROUBAUD, this *Bulletin*, 1937, v. 34, 891]. *J. F. Corson.*

HEILMAN, F. R. & HERRELL, W. E. **Penicillin in the Treatment of Experimental Relapsing Fever.** *Proc. Staff Meetings of the Mayo Clinic.* 1943, Dec. 1, v. 18, No. 24, 457–67, 2 figs. [11 refs.]

An account of results obtained by the use of penicillin in the treatment of mice infected with *Spirochaeta novyi* [see this *Bulletin*, 1944, v. 41, 293].

In vitro tests were made with citrated and heparinized rat blood, containing numerous spirochaetes, to which 10 per cent. sodium penicillin in saline solution was added. Concentrations of 0·1, 1, 10 and 100 Oxford units of penicillin per cc. caused no visible decrease in motility of the spirochaetes kept at room temperature up to seven hours.

In vivo tests were made with white mice inoculated intraperitoneally with a large dose of *S. novyi* and treatment with penicillin was started 22 hours after the inoculation and continued for 4 days. Subcutaneous injections, each of 125 Oxford units of sodium penicillin in solution, were administered four times during the daytime and an additional dose of 500 units of powdered sodium penicillin in sesame oil was given at 9 p.m., to last through the night. Of 26 mice treated in this way, only one died, and the cause of death was unknown, whilst of 28 untreated controls, 21 died of spirochaetosis. Of the seven which lived, all showed relapses, whilst of the 25 treated mice which lived only four had a relapse. In this study relatively large doses of penicillin were used, but the infections were "overwhelming"; it seems probable that smaller doses would be effective in the treatment of relapsing fever if the inoculum was less virulent. *E. Hindle.*

AUGUSTINE, D. L., WEINMAN, D. & MCALLISTER, Joan. **Rapid and Sterilizing Effect of Penicillin Sodium in Experimental Relapsing Fever Infections and its Ineffectiveness in the Treatment of Trypanosomiasis** (*Trypanosoma lewisi*) **and Toxoplasmosis.** *Science.* 1944, Jan. 7, 19–20.

A preliminary report dealing with the results obtained with penicillin sodium therapy in the following experimental infections: (1) *Trypanosoma lewisi* in laboratory rats; (2) *Toxoplasma* in mice; and (3) *Spirochaeta novyi* in mice.

Six rats were infected with *T. lewisi*, four treated each with a total dose of 32,000 Oxford units of penicillin (2,000 units 3-hourly), and two were kept as controls. No significant difference was noted in the number of trypanosomes in treated and untreated animals.

Sixteen mice were infected by the intraperitoneal inoculation of *Toxoplasma* highly pathogenic for mice, and half of them were treated with total doses ranging from 6,500 to 9,000 units. The treated mice died after the same interval as the infected, untreated controls.

In the case of relapsing fever (a strain of *S. novyi*), eleven mice were infected and after 24 hours six mice were treated intraperitoneally, each by 1,000 units for a first dose and then 500 units every three hours for 48 hours. After 27 hours spirochaetes had disappeared from the blood of all treated mice, whilst the five controls were all heavily infected. The blood of two of the treated mice, 60 hours after treatment, was subinoculated intraperitoneally into two normal mice, which remained uninfected.

In a second experiment a relapsing fever mouse, after receiving 4,000 units in 19 hours, was found to be a carrier, although no spirochaetes were seen by direct examination. *E. Hindle.*

LEPROSY.

IBARRA PEREZ, R. & GONZALEZ PRENDES, M. A. Incidencia de la lepra según la edad. [**Age-Incidence of Leprosy (in Havana).**] *Rev. Leprologia, Dermatologia y Sifilografia.* Marianao, Cuba. 1944, Apr., v. 1, No. 2, 5–14. [20 refs.]

Most authorities are agreed that the symptoms of leprosy often make their appearance about the time of puberty, and ascribe this to the biological changes of that period, the increased bodily activity and, in part also, to general lowering of defence by malnutrition, intestinal parasitism and anaemia. Spread of the disease is, as elsewhere, fostered by poverty and promiscuity of living, the healthy occupying not only the same house, but also the same room and even the same bed as the sick. The authors' study is based on 611 cases at the San Lázaro Hospital, Rincón, Havana. By " age incidence " the authors mean the age at which the patient first noticed any sign or that at which close questioning elicited any such. One hundred (16·4 per cent.) came within the 11–15 years period and 110 (18·2 per cent.) in the 16–20 years period, or 34·6 per cent. in the second decade. In the first decade 10·3, in the third 24·4, in the fourth 14·9, in the fifth 9·3, in the sixth 5, and in the seventh 1·3 per cent. Somewhat arbitrarily, in order to facilitate comparison with other countries, they regard the average incubation period as three years and so work out the proportions infected in successive decades as 19·5, 34·7, 19·5, 13·1, 8·0, 4·6, and 0·6 per cent., that is, more than half the patients become infected before the age of twenty years.

Comparing these figures with those from Southern Russia, India, Molokai and the Sudan, the authors give the following figures :—

Country	0–10 years	0–20 years	0–30 years
Cuba	19·49	54·20	73·69
S. Russia	19·40	54·70	73·50
India	19·59	47·36	73·41
Molokai	21·50	54·70	72·50
Sudan	39·08	73·17	84·98

The rest of this article gives figures culled from similar reports by individual investigators of leprosy in Spain, Mexico, the Argentine, San Paulo, Rio de Janeiro and elsewhere. *H. Harold Scott.*

HELMINTHIASIS.

LAURENT, C., BARGE, P., BERGE, C., AUDOYE, H. & FAUCONNIER, J. Deux nouveaux cas d'infestation par la grande douve du foie (*Fasciola hepatica*). [**Two New Cases of Infestation with** *Fasciola hepatica.*] *Arch. Inst. Pasteur de Tunis.* 1942, June, v. 31, No. 1–2, 154–8.

The authors have previously reported [this *Bulletin*, 1942, v. 39, 703] a case of hepatic distomiasis which was, so far as they knew, the first to be recorded in Tunisia. They then said that they thought that this infestation should not be very rare in this region.

Two more cases are now recorded, both in Europeans. The first subject was a mechanic, aged 34, born at Paramé. In 1938 he had had dyspepsia without painful crises and his blood was then normal. From April till July 1940 he had lived in Sfax and there ate watercress every day. On examination there was pain on palpation of the region of the gall bladder, the blood showed a lymphocytosis and 6 per cent. of eosinophils. Later, pain increased and now came on two hours after food, radiating to the right shoulder. Bile was obtained by duodenal intubation and in it the eggs of *Fasciola hepatica* were found. A month later these were also found in the stools, together with cysts of *Giardia*. The Casoni reaction was slowly positive. The patient was given 20 injections of anthiomaline. A table gives particulars of the blood examinations.

The second subject was a woman aged 44, who was born in Bizerta and had practically never left that town. Sometimes she had eaten cress bought in the Bizerta market. She had a history of hepatic insufficiency and painful crises suggesting gall stones. There was a lymphocytosis and an eosinophilia of 19 per cent. The liver was much enlarged. Operation in September 1941 revealed a whitish tumour as big as a duck's egg near the anterior border of the right lobe of the liver, which may have represented the calcified gall bladder, which could not be found. This was extirpated surgically. There was another oblong, smooth mass in the liver from which about 250 cc. of reddish fluid was drawn off. Some 20 small calculi of cholesterin were also removed. The liver also was studded with whitish granulations the size of a millet seed, which histological examination showed to be fibrous tissue. A living *Fasciola hepatica* was removed from the cystic duct. The operation is described. From the biliary fistula resulting from it, eggs of *Fasciola hepatica* were obtained. The patient also had a serous parovarian cyst which was removed at a second operation. The patient was exhausted by these two operations and did not have treatment for the fluke. The fluke and material removed from the liver were sent to Professor Joyeux at Marseilles and he reported that the fluke was a sexually mature *F. hepatica* and that the cyst removed was a degenerate hydatid cyst. The authors are unable to say whether the hypertrophic cirrhosis was due to the calculi or the parasite or whether there was any relation between the fluke and the calculi. They are more than ever disposed to think that fluke infestation is rather common in Tunisia and think that examination of bile obtained by duodenal intubation should be done in suspected cases. Cress from unknown sources should not be eaten. [*Cf.* this *Bulletin*, 1943, v. 40, 472, and 1944, v. 41, 300.] *G. Lapage.*

CAMERON, T. W. M. **The Morphology, Taxonomy, and Life History of *Metorchis conjunctus* (Cobbold, 1860).** Reprinted from *Canadian J. Res.* 1944, Feb., v. 22, 6–16, 13 figs. [20 refs.]

This trematode was originally described under the name *Distoma conjunctum* by COBBOLD (*J. Proc. Linnean Soc.*, London, 1860, Zool. 5, 1) in England. The original specimen is now in the collection of the Department of Helminthology, London School of Hygiene and Tropical Medicine. Cobbold found it in the bile ducts of an American red fox (*Canis fulvus*), which had died in the Gardens of the Zoological Society of London. Cameron now places it in the genus *Metorchis*.

He describes its morphology and gives 9 figures of species from various mammals and 4 of the egg and larval stages.

There are at present three recognized species of *Metorchis* from mammals : *M. albidus*, *M. felis* and *M. conjunctus*. All are very similar and all have a definite geographical distribution. HSÜ, DU, and CHOW (*Bull. Fan Memorial Inst. Biol.*, Zool. Ser. 8, 1938, 1–8) have differentiated the European species *M. albidus* from the Chinese species, *M. felis*. The North American species is *M. conjunctus*. Cameron discusses the differentiation of the very extensive series of specimens of New species from Canada, which have not the spatulate form of the European species, the body being linguiform, while the testes are entire or only slightly lobed and the yolk glands extend anterior to the uterine coils. Cameron thinks that *M. albidus* reported by FREEMAN, A. E. Jr., and ACKERT (*Trans. Amer. Microscop. Soc.*, 1937, v. 56, 113) from a Californian dog recently imported from Alaska " quite possibly " should be referred to *M. conjunctus.*, although Alaska is outside the present known range of *M. conjunctus* and the exact identity of this species must at present remain in abeyance.

The life history of *M. felis* is not known ; nor is that of *M. albidus* except that it is carried by a fish. Cameron describes the life history of *M. conjunctus*. It is very similar to that of *Opisthorchis felineus* described by VOGEL [this *Bulletin*, 1935, v. 32, 251]. The egg is already embryonated when it is laid. It is ingested by the snail *Amnicola limosa porata* and the miracidium presumably escapes in the intestine of the snail. Sporocysts and rediae are formed in the liver of the snail and these are described and figured, together with the cercaria and metacercaria. The metacercaria is very like that of *Opisthorchis felineus*. It is confined to the muscles of the body of the second intermediate host, which is the common sucker *Catostomus commersonii*, which proved to be the only fish infected among the hundreds of fish belonging to seven species collected from Lake Edward, Quebec County. This area is known to be a centre of infection of mink and red fox with the fluke. During seven years of study of fish, the common sucker only has been implicated. Suckers fed to cats infected them. Fluke eggs fed to *Amnicola* infected them with cercariae. " Wild " cercariae fed to suckers obtained from an area free from the fluke infected these and cats were infected from these suckers. The young *Metorchis* apparently passes up the bile ducts to reach the liver. Eggs were never found in the faeces of infected cats until 28 days after the meal of infected fish. The fluke can live for at least five years in the cat. *Metorchis* in Canada is distributed roughly from the Laurentian Mountains to Saskatchewan and from the United States border to Hudson's Bay. It has been found naturally in man, dog, red fox, mink, raccoon and cat ; and experimentally in the dog, cat, red and silver fox, mink and ferret. Attempts to infect a pig and rodents were not successful and it is not yet known naturally or experimentally in birds.

G. Lapage.

HOLMAN, E. & PIERSON, P. **Multiple Echinococcus Cysts of the Lung, Liver and Abdomen.** *J. Amer. Med. Ass.* 1944, Apr. 1, v. 124, No. 14, 955–8, 7 figs.

The diagnosis of hydatid disease is, the authors say, usually regarded in the United States as a remote possibility, but it can be confidently

predicted that this disease will become more common. Both the intradermal and the complement fixation test are, the authors think, unreliable and a remarkable feature of the disease is the extent to which organs may be involved without the appearance of any objective or subjective symptoms. The disease may have been present for years before symptoms occur. Three cases are described which illustrate these points.

The first subject was a Basque sheep herder, born in the Pyrenees, who had lived for many years in the United States. He was " extremely sensitive to Echinococcus cyst fluid introduced subcutaneously." His principal symptoms were increasing shortness of breath and some thoracic pain. The liver was not enlarged. Radiograms showed two large cannon-ball-like shadows in the chest, one on each side. At operation under cyclopropane anaesthesia a cyst was found adherent to the parietal pleura on the right side, which proved to be a hydatid cyst. This was removed and a second cyst on the left side was removed at a second operation. Three years later the patient was normal.

The second subject was a schoolgirl aged 18. An operation for appendicitis revealed a pelvic cyst adjacent to the right ovary which was accidentally opened and proved to contain daughter cysts. There had been little illness in the patient's history. She had played with three dogs. The Echinococcus skin test was strongly positive. Three separate cysts were also found penetrating into the thorax through the dome of the diaphragm ; these measured 4×6 cm., 4×4 cm. and 3×3 cm. At least two large cysts were found in the liver, one being multilocular and about 10 cm. in diameter. Another cyst was found on the under surface of the liver. Postoperative progress was without incident except for two days of fever and generalized abdominal pain. The subhepatic cyst was removed three months later and the abdomen was explored. In it there was " a 2 cm. nodule " just lateral and firmly attached to the uterus, a second nodule between the spleen and the diaphragm and a third was removed from the under surface of the liver. Recovery was uneventful. The third subject was a married woman aged 59 who had had cough, bloody sputum and pain in the right chest. The intradermal test was positive with increased temperature and focal signs in the right chest. Radiograms suggested echinococcus, but previous radiograms had suggested multiple metaplastic nodules in the right upper lung of unknown origin. Bronchoscopy had previously suggested a mediastinal neoplasm. Operation revealed a carcinoma of the bronchus and the patient died. Autopsy was not permitted.

The authors emphasize the unreliability of the skin test and eosinophilia as diagnostic signs. They point out that hepatic cysts may penetrate the diaphragm and that the fibrous investment of the cysts, which is often partly calcified, allows of excision of abdominal cysts without fear of entering the cyst cavity. Their procedure is to aspirate off 30–50 cc. of cyst fluid, inject 10–20 cc. of 10 per cent. solution of formaldehyde into the cyst and after several minutes make a small incision into the cyst and remove its contents with a sucker such as is used for tonsillectomy. This removes the germinal layer as well. The wall of the cyst is then wiped with gauze soaked in 10 per cent. solution of formaldehyde and the cavity is washed out with saline. Drainage and packing of the cyst are not necessary and are contraindicated to avoid secondary infection in a potentially incollapsible cavity. Except when pus is present, due to secondary infection, the cyst cavity should be filled with saline and the incision of approach closed without

drainage. Multiple cysts of the lung involving both sides of the thorax should be dealt with in two stages. If calcification has occurred in the liver or lung, it is necessary only to suck out the germinal layer and contents, leaving the calcified wall behind; but suction may be complicated by pneumothorax unless a small catheter is put into the bed of the cyst and connected externally with an under-water seal to provide for escape of air. *G. Lapage.*

GRAÑA, A. **Antibodies against Sheep Erythrocytes produced by the Injection of Hydatid Liquid in Patients with Hydatid Cyst.** *J. Immunology.* 1944, Mar., v. 48, No. 3, 203–11. [14 refs.]

In the serum of 10 patients, with hydatid cysts, given subcutaneous injections of hydatid fluid, Graña [*Día Médico*, Buenos Aires, 1942, v. 14, 1092] found a remarkable increase of haemolysins and agglutinins for red cells of sheep. In the present paper he studies the conditions necessary for the appearance of these heterologous antibodies. The material used was the serum of 20 patients with hydatid cysts who were injected subcutaneously with hydatid cyst fluid and there were five normal people and two asthmatics as controls. Injections of hydatid fluid were also given to 10 healthy rabbits and their sera were studied. Such antibodies were not increased in the human controls nor in the uninfected rabbits. He presents the hypothesis that previous sensitization of the tissues to hydatid antigen is necessary for the appearance of this type of heterophilic antibodies, because these changes are most marked in patients who react most intensely to subcutaneous injection of hydatid fluid, and are not seen in people without hydatid cysts nor in non-infected rabbits. The author thinks that work now being done by him suggests that these antibodies are not of the Forssman type, but represent a new type within the wide group of heterophilic antibodies. *G. Lapage.*

LARSH, J. E., Jr. **Studies on the Artificial Immunization of Mice against Infection with the Dwarf Tapeworm, *Hymenolepis nana* var. *fraterna*.** *Amer. J. Hyg.* 1944, Mar., v. 39, No. 2, 129–32.

HEARIN, [this *Bulletin*, 1942, v. 39, 93] tried to produce immunity in mice against *Hymenolepis nana* var. *fraterna* by intraperitoneal injections of viable adult worms and eggs, instead of using antigen prepared from dried worm substance; but the mice injected harboured the same number of cysticercoids as the untreated controls infested with *H. nana*. As there is abundant evidence that mice acquire, as a result of infestation, a high grade of immunity and develop specific antibodies, Larsh tried to produce immunity by injecting "suspensions of fresh worm antigen."

Adult worms were washed in several changes of normal saline and about 200–300 washed worms were macerated with sterile sand in a mortar. To this saline was added to a volume of about 0·03 cc. per worm. After settlement for one hour the supernatant fluid was at once used as antigen. The experimental mice were two months old and were known to be free from *H. nana* [see LARSH, this *Bulletin*, 1943, v. 40, 322]. Each of these mice was given four intraperitoneal injections of 0·25 cc. of the antigen over a period of two weeks. A week after the last injection these mice and the same number of controls were given

test doses of eggs of *H. nana* varying from 1,170 to 2,000. Six experiments were done and in each of them there were strikingly fewer 93-hour cycticercoids in the mice given the injections of antigen. In the controls the range of percentage development of the cysticercoids was 4·4 to 5·6; in the immunized mice it was 0·03 to 1·1 per cent.

Larsh then tried to transmit this immunity to the offspring. Female mice, 3 months old, were given the first of five injections of 0·25 cc. of antigen a few days before conception and the other four injections at intervals of four days, the last being four days before parturition. The young mice were allowed to suckle and, when they were 24–30 days old, they were compared with controls of the same age which were born of and suckled by mothers which had not been immunized. All these mice were given test doses of eggs of *H. nana*. In all cases the young of the immunized mothers had fewer 93-hour cysticercoids. The percentage development of the cysticercoids in the immunized series was 1 to 2·2; in the controls it was 2·7 to 3·4. Thus the young of the immunized mothers had an immunity, but this was not so high as that of young born of and suckled by infested mothers [see LARSH, *loc. cit*]. These results agree with those of MILLER [this *Bulletin*, 1931, v. 28, 205] on the immunity of the white rat to infestations with *Taenia taeniaeformis* (*Cysticercus fasciolaris*) and those of KERR [this *Bulletin*, 1936, v. 33, 104] on *Taenia pisiformis* (*Cysticercus pisiformis*).

No attempt was made to define the route of transfer of the immunity; but Larsh (*op. cit.*) showed that it took place both *in utero* and in the milk. The evidence suggests that the milk plays the greater part, because the young of non-immune mothers, nursed by immune mothers, show greater resistance for a longer time than those of immune mothers nursed by non-immune mothers. CULBERTSON (*J. Parasitology*, 1938, v. 24, 65) found that the milk plays a greater part than transfer *in utero* in the transfer of immunity of rats to *Trypanosoma lewisi*, and this is also true after artificial immunization against this species [CULBERTSON, this *Bulletin*, 1941, v. 38, 314.] *G. Lapage.*

LARSH, J. E., Jr. **The Relation between Splenectomy and the Resistance of Old Mice to Infection with *Hymenolepis nana* var. *fraterna*.** *Amer. J. Hyg.* 1944, Mar., v. 39, No. 2, 133–7.

The author claims that the literature indicates that removal of a large part of the so-called reticulo-endothelial system, as, for example, by splenectomy, influences susceptibility to various infections. In this paper he compares splenectomized and normal mice which were infested with *Hymenolepis nana* var. *fraterna*.

The whole spleen was removed and the operation is described. The controls were also operated upon, but the spleen was left intact, the tissue round it being given the same trauma in order to eliminate from the results the effects of shock. Animals thus treated are called Shams.

The first experiments were designed to indicate whether splenectomy influenced an initial infestation and this was based on the number of 93-hour cysticercoids found [see HUNNINEN, this *Bulletin*, 1936, v. 33, 99]. A group of mice operated upon but not infested was included in order to indicate any effects of the operation. Of the 50 mice used, 20 were splenectomized, 20 were shams and 10 were controls. One week after the operation 10 splenectomized mice, 10 shams and 10 controls were selected and three of each group were given 1,200 eggs of *H. nana*

and the other seven were given 2,000 eggs. The number of 93-hour cysticercoids found was about the same in all three groups, so that there was no evidence that splenectomy had increased susceptibility to infestation or that the operation had affected it.

Several months later, when the rest of the mice were six months old, 10 splenectomized mice and 10 shams, together with 10 young controls, aged 2–5 months (the most susceptible age), were given 1,000 eggs each. The parasite burden in both the splenectomized and shams was only about a quarter of that of the mice used in the first experiment, but the percentage development in the splenectomized mice (2·81) was more than twice that in the shams (1·1) and was unusually high for mice of this age, although the increased resistance in the shams is usual for mice of this age. The shams and controls showed normal percentages of haemoglobin (99 and 98 per cent. respectively) but this percentage in the splenectomized mice was 79 per cent. This experiment suggested that mice deprived of their spleens when they are young are more susceptible in later life. A more elaborate experiment was done on similar lines, in which individuals among 70 mice (35 splenectomized and 35 shams) were given eight tests at intervals of one week to 10·5 months after operation. The results indicated that, when the mice were 2–5 months old, the average percentage development of 93-hour cysticercoids was 6·0 in the splenectomized, 5·8 in the shams and 6·2 in the controls. When the mice were 3–5 months old, the corresponding figures were 3·8, 3·4 and 5·6. When tests were done at the ages of 5, 10, 11, 12 and 13 months, the percentage development of cysticercoids was strikingly higher in the splenectomized mice (2·5 in the third test to 5·4 in the fifth) than in the shams (0·9 in the third test to 0·1 in the sixth); in the controls it was about the same in all these six tests (4·6 in the sixth to 6·3 in the seventh). The haemoglobin in the shams and controls was 95–102 per cent.; in the splenectomized mice it gradually dropped from 101 to 74 per cent. At 3·5 months the shams seemed to be showing age resistance already, but in the last six tests some shams showed no cysticercoids at all and the largest number found was only 34 at the fourth test. Their haemoglobin level was practically unchanged throughout and was similar to that of the controls. But the splenectomized mice in the last six tests showed a well-defined susceptibility which in some cases almost equalled that of the controls, which were only 2–5 months old, *i.e.*, at the most susceptible age; also the fall in their haemoglobin percentage became pronounced in the later tests. The author therefore thinks it reasonable to suppose that the anaemia is one factor in their increased susceptibility, but it is not known how it operates. It was not due to infection with *Bartonella* because this was not found in smears. *G. Lapage.*

WATT, J. Y. C. **The Influence of Vitamins B_1 (Thiamine) and B_2 (Riboflavin) upon the Resistance of Rats to Infection with** *Nippostrongylus muris*. *Amer. J. Hyg.* 1944, Mar., v. 39, No. 2, 145–51.

The author reviews some of the literature which indicates that lack of the vitamin B complex renders animals more susceptible to helminth infestations (*e.g.*, *Ascaridia lineata* in poultry). Inquiring into the question of which element in this complex is responsible, he concludes that deficiency of either riboflavin or thiamin reduces the resistance of rats to infestations with *Nippostrongylus muris*.

Details of the different diets given are recorded. The criteria of resistance are (1) the number of *N. muris* remaining in the intestines of rats at the end of the second week of the infestation (see SCHWARTZ, ALICATA, and LUCKER, *J. Wash. Acad. Sci.*, 1931, v. 21, 259) ; (2) the distribution of the worms not only in the intestines but also in the lungs 12 to 14 days after the infective larvae have been given ; (3) the effect of partial vitamin B_1 (thiamin) deficiency on the immunological potency of the plasma or sera in passive transfer of immunity. Experiment 1 showed that, after a primary infestation, with 2,300 larvae of *N. muris*, there were more worms in the rats on diets deficient in Vitamin B_1, but the difference was not striking. Experiment 2 showed that B_1 deficiency reduced resistance to superinfection (*i.e.* when 2,000 larvae were given at the peak of the infestation caused by 2,000 larvae previously given). In experiment three rats on a normal diet received a series of infestations with larvae ; some of them were then put on diets deficient in vitamin B_1 and some were not, all being again infested. There were more worms in the rats put on the deficient diet. Resistance to subsequent infestation was thus reduced by vitamin B_1 deficiency. Earlier work has shown that sera and plasma from hyper-immunized rats when they are given to normal rats, protect them from infestation with *N. muris*. Watt found, however, that rats, given immune plasma from rats fed on a diet deficient in vitamin B_1, had more worms. This plasma had therefore not been as effective as immune plasma taken from rats on a normal diet.

Similar results were obtained when the diets were deficient in vitamin B_2. *G. Lapage.*

ARDAO, H. A. & ZERBONI, E. Ileo vermicular. Radiología de las ascaridiasis. [**Verminous Ileus ; Radiology of Ascariasis.**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1944, Jan., v. 24, No. 1, 82–93, 12 figs.

The patient, an adult male, had suffered for three days from diffuse abdominal pains, which had increased to become violent colic, mainly supraumbilical. On admission he was well-nourished, but the abdomen looked asymmetrical, being inflated in the hypogastrium and left iliac fossa. Palpation revealed an elastic mass resembling an intestinal loop, which was movable towards the median line and was very painful, palpation causing crises of pain. The mass was directed obliquely downwards and disappeared into the pelvis at the top of the pubis. Rectal examination revealed a painful mass in the pelvis apparently continuous with the mass in the hypogastrium. Laparotomy showed an enormous loop of the small intestine (ileum) 40–50 cm. long. It was reddish, with numerous punctiform ecchymoses. There were large subserous effusions, especially at the union with the mesentery, and in these there were numerous roseate tumours like kidney beans with haemorrhagic foci in them. In this loop undulatory movements were seen. As well as the reddish colour there were numerous raised whitish areas. The loop was elastic, malleable and gave the sensation of packets of worms matted together. The whitish raised areas corresponded to the angles of the matted worms. Enterotomy was performed and about 128 specimens of *Ascaris lumbricoides* were removed ; but numerous worms remained above and below the enterotomy. After a purging enema the patient expelled 12 more. He recovered without incident. Diagrams illustrate the operation done.

The rest of the paper deals with radiological examination for the detection of *Ascaris* in this and other patients. The authors think that radiology can directly prove the presence of *Ascaris* and may be a better method than examination of the vomit or faeces, both of which may be negative when *Ascaris* is present, *e.g.*, when only males or infertile females are present. Serological and other methods referred to must, they think, be used with caution. The patient, moreover, may be unaware of any symptoms due to *Ascaris*. The radiological shadow given by *Ascaris* is sufficiently typical, but a negative radiological examination has no value, because the worms may be so situated that they cannot be seen. After a brief reference to earlier work, the authors say that it is more difficult to detect the worms radiologically when they are in the ileum and repeated examinations are then necessary. In the small intestine, after ingestion of an opaque substance, *Ascaris* is revealed by a deficiency in the medium, which takes the form of a cylinder (or a fluted column) with parallel outlines, clear contours and spindle-shaped ends. This cylindrical form is seen when the rays strike the longitudinal axis of the parasite perpendicularly; when the rays are parallel to this the parasite appears as a disk with a diameter equal to that of the body of *Ascaris*. In simple radiological examinations of the abdomen *Ascaris* may be visible by contrast with the intestinal gas as a uniformly opaque cylinder with possibly clear areas in it which represent gas in the intestine of the parasite; or there may be a disk with a clear area in it. The disk images shown by *Ascaris* must be distinguished from those shown by polypi and foreign bodies, such as fruit cores or urinary calculi. In such cases radiograms should be taken from different positions and, if these fail to show the characteristic cylindrical image of *Ascaris*, the presence of worms can be ruled out. When the barium or other opaque medium has left the gut of the host, the gut of *Ascaris* may still be full of it and its body may then not be visible, so that only a rectilinear tract with a smooth curve is seen, which represents the gut of *Ascaris*. *G. Lapage.*

EARLE, K. V. **Asthma produced by Ascaris Infestation.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, May, v. 37, No. 6, 451–2.

A young negro was seen at night sitting outside the sick bay of a ship with his hands "pressed tightly to the deck so as to bring the accessory respiratory muscles into play. He was extremely cyanosed, sweating, with cold extremities, and feeble pulse. He was also extremely nervous, alarmed at what was to him a novel experience, and was convinced that he was going to die." Before treatment could be given he vomited three live *Ascaris* worms and at once felt greatly relieved. The author gave him an injection of adrenaline but thinks that he might have recovered without it. There was no personal or family history of asthma or other allergic disease. He was treated with hexylresorcinol but no more worms were passed and no ova or protozoa were found in the faeces. Skin tests with an aqueous extract of preserved *Ascaris* were positive. In discussing the case the author refers to the mention in text-books of asthma due to *Ascaris* infestation and to a paper by HANSEN (*Practitioner*, 1929, v. 123, 52).

J. F. Corson.

OLDHAM, J. N. & WHITE, E. G. **Chronic Focal Interstitial Hepatitis in the Pig: its Experimental Production by feeding *Ascaris* Eggs.** *J. Comp. Path. & Therap.* 1944, Jan., v. 54, No. 1, 1–15, 13 figs. (12 on 4 pls.)

The success of these authors in clearing up the aetiology of "white spot liver" of pigs is now well known (WHITE, *Vet. J.*, 1941, v. 97, 155, and OLDHAM & WHITE, *Vet. J.*, 1942, v. 98, 16). The present paper, which is a more extensive and detailed study of this problem, should be read by everyone interested in it. Eggs were obtained from the uteri of female *Ascaris lumbricoides* as for the earlier experiments; these eggs were incubated at 30°C. for 12 weeks before they were fed to rabbits and guineapigs to test their infectivity. This long incubation was done because *Ascaris* eggs, which are said to become infective at about the 18th day, must go through a post-embryonation time lag (maturation period) before they become infective. In 1940 the infective eggs were fed to 9 pigs 8–11 months old. Four of these were given 1,600,000 eggs in the combined feed for all of them and four were given 400,000 eggs each by the mouth with a hypodermic syringe; one "ratling" was given 200,000 eggs. At intervals the pigs were killed and the liver and kidney were sectioned and examined. The minced liver and lungs were also examined for larvae in a Baermann apparatus. Just before killing, blood films were taken. The peritoneal and thoracic cavities and the trachea of some of the pigs were washed out with saline and the washings examined for larvae. The faeces of each pig were also examined for eggs by the sugar floatation method. In the second experiment in 1941, 11 weaned pigs 11 weeks old were used. These were selected from a sow whose faeces had been examined for *Ascaris* eggs at intervals of three weeks and had been always negative. This was done because the first experiment had been complicated by the presence of immature *Ascaris* in the intestines of some of the pigs. It turned out, however, that the attempt to obtain an *Ascaris*-free pig had failed, so that both experiments were confused by natural infection. In this second experiment, additional blood films were examined when the eggs were given as well as when the animals were killed and a modified Baermann method was used. A table and graphs give the results of the blood examinations and full protocols record the results. They cannot be summarized here. There are good photographs of the whole liver and of sections of livers and one of a lung.

The first experiment showed that lesions identical in appearance with those of natural "white spot liver" can be produced in young pigs by feeding them with embryonated eggs of *Ascaris*. Early lesions showed a central haemorrhagic zone with destruction of liver cells and intense eosinophil infiltration, followed by absorption and repair and fibroblast proliferation in the neighbouring interlobular septa. Old lesions showed persistent thickening of the septa and eosinophil infiltration. Lymphoid tissue was formed in the lesions and the larger masses of this formed spherical "follicles" like those which have been described in the natural lesions. Although most of the lesions appeared to be on the surface of the liver, many deep lesions were demonstrated by sections. The fact that the lesions on the anterior and posterior surfaces of the liver were roughly similar in number supported the generally accepted view that the liver is infected through the portal vein and not through the peritoneal cavity. No larvae were found in peritoneal washings. Experiment 2 confirmed the findings of experiment 1.

In the blood the only significant change was the eosinophilia. The highest level reached was 23·7 per cent. The development and time relations of the eosinophilia in pigs given repeat small doses of eggs were similar to those in pigs given a single large dose. Thus it appears that only the initial dose causes a marked rise in the blood eosinophils, the level returning to normal in four to five weeks, so that a differential white cell count is not likely to be of value in diagnosis, except in the initial migratory phase of the parasites. *G. Lapage.*

MENON, T. B., RAMAMURTI, B. & SUNDARASIVA RAO, D. **Lizard Filariasis. An Experimental Study.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, May, v. 37, No. 6, 373–86, 1 diagram & 4 pls. [10 refs.]

The authors have worked out the course of development of the filaria of the lizard which resembles *Wuchereria bancrofti* and is, like that species, transmitted by *Culex fatigans*. Throughout their paper the authors discuss their findings in relation to what is known about *W. bancrofti*. In both species the developmental stages in the vector, the period of maturation of the larvae, the effects of temperature, humidity, etc., and of hyperinfection of the vector are all closely similar. The authors regard as significant the development of the larvae of this lizard species in the deeper lymphatics and their tendency to migrate along the lymphatics to the mesenteric lymphatics. The developmental stages are fully described together with the lesions produced. Discussing the mechanism of lymphatic obstruction the authors conclude that it is due to inflammatory changes round the worms.

Excellent photographs illustrate the paper, one showing oedema of the lizard's forelimb and one the larvae in the mesentery and lymphatics. Visible oedema was not, however, common. There were no early effects on the lizard. If the infestation is heavy the lizards become inactive, lose appetite, cease to show colour changes in the skin and, after a period of torpor, they die. *G. Lapage.*

CULBERTSON, J. T., ROSE, H. M. & DEMAREST, Constance R. **Loaiasis and Onchocerciasis : a New Antigen for their Diagnosis by Skin Test.** *Amer. J. Hyg.* 1944, Mar., v. 39, No. 2, 152–5, 1 fig.

Loaiasis and onchocerciasis are rare in the United States. The serological diagnosis of them is usually attempted with antigen prepared from *Dirofilaria immitis* of the dog, but *Contortospiculum rheae* of the ostrich has been tried by MOHR and LIPPELT [this *Bulletin*, 1941, v. 38, 518].

The author tried *Litomosoides carinii* from the cotton rat (*Sigmodon hispidus*) (see VAZ, *Ann. Trop. Med. & Parasit.*, 1934, v. 28, 143), which is present in a considerable percentage of cotton rats and often in large numbers. As many as 25 may be found in the pleural cavity of one rat and they have proved to be a rich source of antigen.

The antigen is made by washing the worms repeatedly in water, drying them in the air at 37°C. followed by trituration in a mortar. A 1 per cent. emulsion of the worm powder thus obtained is made in 0·5 per cent. carbol saline ; this is incubated at 37°C., centrifuged, and the supernatant fluid used as stock. For the intradermal test 0·1 cc. of this was injected into the volar surface of the forearm.

An extended weal with pseudopodia increasing in size and prominence for 5–6 minutes constitutes a positive reaction. After 15 minutes the weal faded, but local oedema and induration often persisted for 6–24 or even for 48 hours. In some tests there was also erythema, but this also occurred in the controls and it was ignored as a diagnostic sign. Two patients with loaiasis were tested. The first, a white male aged 18, who had been born in and had lived in Nigeria, had seen an adult *Loa* in his eye several times and had had fugitive swellings on his arm and legs; there were numerous microfilariae in his blood. The second was a white woman of middle age, a zoologist, who had visited the Belgian Congo for two weeks in 1936. On her return to New York she had had a generalized urticaria. She had seen a worm in the conjunctiva, but no microfilariae were found in the blood. The skin tests done on both were positive (immediate reactions).

Two patients had onchocerciasis. They were a mother, aged 35, and her boy, aged seven, who had returned from Guatemala. The boy had several *Onchocerca* nodules and two had been removed from him earlier; he also had episcleritis and punctate areas of subepithelial infiltration in the cornea, but no microfilariae were found in his blood. The mother had no symptoms of onchocerciasis but had one nodule at the base of the scalp. Both gave immediate reactions and also a delayed reaction, which was severe in the mother, her arm being swollen to the shoulder for five hours and tender for 48 hours. Both were negative to carbol-saline alone.

Tests were then done on 40 persons not suspected of filarial infestation. Of these 38 were negative. Two showed distinct weals with pseudopodia. One of these, a medical student, had given a positive skin test two years earlier to *Trichinella* antigen (see below); the other, a negro of 30, has since shown enlargement of the thigh, suggesting elephantiasis.

No tests have yet been done on possible cross reactions with other nematodes which are not Filarioidea, but positive reactions with some of these are expected. Further work is required to indicate whether this antigen is better than that derived from *Dirofilaria immitis*.

G. Lapage.

Culbertson, J. T., Rose, H. M. & Demarest, Constance R. *Filariasis bancrofti*: **its Diagnosis by Immunological Tests with Antigen derived from** *Litomosoides carinii*. *Amer. J. Hyg.* 1944, Mar., v. 39, No. 2, 156–62, 1 fig.

From the Tahiti area, where *Wuchereria bancrofti* is endemic, 110 soldiers returned to New York after a 12 months' stay there. Many had had temporary enlargements of the scrotum and testis and some had had temporary enlargements of the limbs and forearms. Practically all had had lymphadenitis at some time; but no microfilariae were found in the blood of any of them. When preliminary skin tests with antigen derived from *Litomosoides carinii* (see above) were done seven out of nine men tested gave some response. Further tests were then made on 81 men and the blood of 77 of these was taken for precipitin and complement fixation tests and for examination for eosinophilia and microfilariae. The antigen dilution used was about 1 : 200 for the skin tests. For precipitin and complement fixation tests 5 per cent. by weight of the worm powder was extracted with saline without phenol at 37°C. for two hours and centrifuged; the

supernatant fluid was then diluted with four parts of saline, making a dilution of about 1 in 125 of the antigen. For the skin test 0·1 cc. of antigen was injected into the forearm (see above); for the precipitin test 0·1 cc. of the patient's serum was overlaid with 0·1 cc. of antigen. Precipitation was usually slight. For complement fixation 0·01 and 0·02 cc. of inactivated serum was mixed with 0·1 cc. of antigen and 0·1 cc. of complement and saline. After fixation at 37°C. for 30 minutes 0·2 cc. of a 2·5 per cent. suspension of sensitized sheep cells was added.

Of the 81 skin tests done, 66 (81·4 per cent.) reacted within five minutes; 15 did not react. None reacted to the control with carbol-saline. Of the 77 complement fixation reactions done, 59 (76·6 per cent.) were positive and 18 were negative. Of the 77 precipitin reactions done, 58 (75·3 per cent.) were positive and 19 were negative. Only 30 out of 77 patients showed more than 4 per cent. of eosinophils and only eight had more than 10 per cent., 21 per cent. being the highest figure recorded. In 17 patients the percentage was 1 or less. No microfilariae were found in any of the patients examined for them. The correlation between these tests was only fair. Control tests were done on 40 persons not suspected of filariasis. The group of persons used for these controls was apparently the same as that used for the control of the skin tests on patients with loaiasis and onchocerciasis reported by these authors [see above]. Control precipitin tests were done on 50 random blood samples from the Wassermann reaction Department. Of these 46 were negative. One of the four positives was the negro suspected of elephantiasis mentioned above. Thirty similar samples were used to control the complement fixation test and 11 of these showed some degree of complement fixation.

The authors think that a significant percentage of persons probably not infected with filaria will give positive skin, precipitin and complement fixation tests with this antigen, which also gives positive reactions with *Loa* and *Onchocerca* (see above); but these could be distinguished from infestations with *W. bancrofti* by clinical signs. More difficulty may be experienced with infestations with *Trichinella*, *Ascaris*, *Trichuris* and hookworm. *G. Lapage.*

CULBERTSON, J. T. & ROSE, H. M. **Chemotherapy of Filariasis in the Cotton Rat by Administration of Neostam.** *Science.* 1944, Mar. 24, 245.

A filarial worm, *Litomosoides carinii*, is a frequent parasite of the Florida cotton rat [*Sigmodon hispidus*]; the adult worms are found in the pleural cavity and the microfilariae can be seen in the peripheral circulation, conveniently in the blood of the tail. The rat was therefore thought to be a suitable animal for chemotherapeutic tests. Among various drugs tried stibamine glucoside ("neostam" of Messrs. Burroughs, Wellcome & Co.) gave particularly favourable results; it was given intramuscularly to 10 cotton rats in doses of 40–60 mgm. four times a week for four to nine weeks. Two untreated rats served as controls. The tail blood was examined almost daily and the microfilariae counted. At the end of each experiment the rat was killed and examined. The numbers of microfilariae in the treated rats diminished greatly within a few weeks and in every case none was found on the day the rat was killed. No living adult filariae were seen *post mortem*, but dead ones, often matted together and numbering

up to 50, were found. In the two control rats the microfilariae remained numerous in the tail blood and living adults were found after death.

The authors suggest that this drug should be tried in human filariasis as NAPIER [this *Bulletin*, 1929, v. 26, 743] found that it was well tolerated. [The doses given to the cotton rats were relatively very much larger than those used by Napier.] *J. F. Corson.*

DEFICIENCY DISEASES.

JONES, H. E., ARMSTRONG, T. G., GREEN, H. F. & CHADWICK, V. **Stomatitis due to Riboflavin Deficiency.** *Lancet.* 1944, June 3, 720–23.

An examination of over 10,000 men of many races in a North African camp has been carried out. Just under 17 per cent. exhibited stomatitis—sore lips, sore tongue, excessive salivation, etc. Some showed a seborrhoeic condition in the nasolabial folds but in none was scrotal dermatosis noted, and routine examination yielded no other evidence of disease. A very full account of the tongue and lip changes is given, which should prove most useful to those not already familiar with these conditions. The observations include " slit-lamp findings " in both normal and affected tongues. [Concerning the use of the slit-lamp to study the tongue lesions the authors say " so far as we know, this has not been done before " but of course the method has been used by other observers for several years.]

The onset of the stomatitis is clearly demonstrated to have occurred in relation to the change from one standard diet containing 1·61 mgm. riboflavin to a second standard diet containing only 1·0 mgm. When a third standard diet containing 1·73 mgm. riboflavin was introduced the symptoms disappeared.

The condition was uninfluenced by calcium lactate, red palm oil (vitamin A), oleum vitamini (vitamins A and D) or nicotinic acid, but cleared up when milk, meat or eggs were added to the diet, while yeast ½ oz. daily, or riboflavin 10 mgm. b.d. for 5 days, gave the most rapid results.

" As vascularizing keratitis is said to be associated with the mouth changes in ariboflavinosis," 75 cases were examined by an ophthalmic specialist who reported that all showed increased vascularity in mild degree but that all were suffering from trachoma, which is almost universal in North Africa ; vascularization is characteristic of trachoma. [It would have been interesting to have had further details upon the last point, as it is not clear whether the ophthalmologist was of the opinion that he could not distinguish between corneal vascularization due to riboflavin deficiency and that due to trachoma, or whether, in the presence of the latter, he was unable to determine the presence of the former.] *H. S. Stannus.*

VENOMS AND ANTIVENENES.

SERGENT, E. Sérothérapie antiscorpionique. Nécessité d'une intervention rapide. Délai d'efficacité de l'injection du sérum antiscorpionique après la piqure du scorpion. [**Treatment by Scorpion Antivenene : The Need for Early Injection.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Dec., v. 21, No. 4, 263–7, 1 fig.

In this note the author points out that, although antivenene should be administered as soon as possible after scorpion sting, cure has been

effected in persons, apparently in desperate condition, even if the serum was not given until many hours had elapsed. He quotes successful cases in which the delay was from 10 to 30 hours. Nevertheless, the proportion of deaths was almost twice as high in those who did not receive antivenene in the first three hours as in those who did.

Charles Wilcocks.

DERMATOLOGY AND FUNGOUS DISEASES.

Snow, J. S. & Harley, R. D. **Dermatitis Venenata and Keratoconjunctivitis caused by the Manzanillo Tree.** *Arch. Dermat. & Syph.* 1944, Apr., v. 49, No. 4, 236–9, 1 fig.

Colvin, S. H., Jr., Gore, I. & Peters, M. **A Case of Histoplasmosis (Darling) with Autopsy.** *Amer. J. Med. Sci.* 1944, Mar., v. 207, No. 3, 378–85, 4 figs.

The interesting feature of this case of histoplasmosis in a young negro soldier is the close resemblance, clinically, of the disease, to tuberculosis: chills and fever, severe night sweating, loss of weight, anaemia, and productive cough with blood-streaked purulent sputum characterized the case, and X-ray examination showed extensive infiltration of both lungs, miliary in type, which led to the diagnosis of pulmonary tuberculosis; but this diagnosis was not confirmed bacteriologically, after many examinations of the sputum.

The patient died after only thirteen days in hospital and the diagnosis of histoplasmosis was made on the results of microscopic examination of the tissues. The disease was most extensive in the lungs, but the liver, spleen and other organs were also severely affected. A detailed description is given of the gross and microscopic morbid anatomy, and the authors point to the partial replacement of the bone marrow by the specific granulation tissue as a cause of the anaemia and leucopenia.

J. T. Duncan.

Thuringer, J. M. **Histoplasmosis. Report of its Occurrence in a Dog.** *Arch. Pathology.* 1944, Feb., v. 37, No. 2, 140–42, 4 figs.

"A second case of canine histoplasmosis calls attention to the possibility that the dog may serve as the natural host and transmitter of this disease to man."

MISCELLANEOUS.

COLONIAL DEVELOPMENT AND WELFARE ACT 1940. **Return of Schemes made under the Colonial Development and Welfare Act, 1940, by the Secretary of State for the Colonies with the concurrence of the Treasury in the Period from 1st April, 1943, to 31st March, 1944.** Cmd. 6532. 16 pp. 1944. London: H.M. Stationery Office. [3*d*.]

COLONIAL RESEARCH COMMITTEE. **First Annual Report 1943–44.** Cmd. 6535. 11 pp. 1944. London: H.M. Stationery Office. [2*d*.]

KARK, S. L. & LE RICHE, H. **A Health Study of South African Bantu School-Children.** *South African Med. J.* 1944, Mar. 25, v. 18, No. 6, 100–103.

This study was made in 1938–39 under the direction of the Secretary for Public Health, and comprised the examination of about 800 school children in each of nine areas (three urban and six rural) in the Transvaal, the Orange Free State, Natal and Cape Province—a total of over 7,000. Each child was given a physical examination, which included somatometric measurements, and various laboratory tests were made on a random sample in each area. Examination was made of the skin; tonsils, cervical glands and ears; eyes; heart and lungs; posture; liver and spleen; haemoglobin; faeces for parasites; urine; the Wassermann reaction. The incidence of abnormalities was high, and figures for the various conditions are set out in detail. There was considerable evidence of nutritional deficiency throughout, especially of riboflavin and nicotinic acid, and possibly of vitamin C. Cervical gland enlargement was present in almost three-quarters of the children, often associated with enlarged or septic tonsils. Trachoma probably causes much of the eye trouble.

Postural deformities due to poor musculature from malnutrition were found in about one-third of the children, and bony deformities in 1·16 per cent. The causes of the latter included injury, tuberculosis, rickets, infantile paralysis and syphilis. Enlargement of the liver was fairly common in most districts, and though schistosomiasis and syphilis may account for some of the cases it is felt that further research into the influence of various food deficiencies would be of interest in this connexion. Splenic enlargement was recorded in four areas only. The mean haemoglobin percentages were about 88 over the whole survey. Intestinal schistosomiasis was found in one area; *Ascaris* infection in four; *Hymenolepis nana* infection in five; and *Taenia* infection in seven. Urinary schistosomiasis was much more common than the intestinal form, being found in five areas; in one of these the percentage of infected children was 70. The Wassermann reaction was positive in 4·76 to 46·38 of children in the various districts, but there was no difference in incidence between the urban and rural groups.

Body measurements showed that Bantu children are significantly lighter and shorter than white, and the authors conclude that environmental factors such as nutrition and preventable diseases are at least as important as hereditary factors in determining the size of the children. In a comparison between the good and bad areas from the point of view of obvious signs of ill-health or malnutrition, it was clear that height and weight varied according to the other signs.

Finally, the authors remark that food policy should aim, not at providing this or that particular food factor, but at increasing all

foodstuffs which tend to build a healthy Bantu population and avert what is at present, in some cases, virtually starvation. Most of the remaining conditions which affect the health of these people are preventable. *Charles Wilcocks.*

FINLAYSON, M. H. **Some Characters exhibited by a Strain of *P. whitmori* isolated from a Case of Chronic Melioidosis.** *South African Med. J.* 1944, Apr. 8, v. 18, No. 7, 113–15.

Two variants corresponding to the rough and smooth forms described by previous workers were examined in detail. In morphology, staining, and cultural characters they corresponded closely with previous descriptions of this organism. One interesting difference was the presence of acid-fast granules which were more numerous in the rough variant and resisted decolourization with 2 per cent. sulphuric acid in young cultures, but in older cultures were resistant to 2·5 per cent. sulphuric acid for five minutes. These granules disappeared on prolonged subcultivation but were restored in animals by infection running a chronic course. The acid-fast property was destroyed by treatment with alcohol in a few seconds. The only unusual cultural feature noted was the liquefaction of Loewenstein's medium (without glycerol) by the rough variant. Growth of the rough variant on agar had a pronounced aromatic odour ; GRANT and BARWELL [this *Bulletin*, 1943, v. 40, 498] made a similar observation. Both variants were destroyed by exposure to 60°C. for 30 minutes, 50 per cent. alcohol for five minutes, and 6 per cent. sulphuric acid for five minutes. Exposure to 50 per cent. urea killed the smooth form in four minutes and the rough form in six minutes. The sera of rabbits immunized with both forms killed by heat (60°C.) gave large-flake agglutination with formolized suspensions of the rough and smooth variants. Neither these sera nor the serum from the patient from whom this strain was isolated agglutinated alcohol-treated suspensions. Both forms were of equal pathogenicity for guineapigs, rabbits and mice, and inoculation of these species of animal with heat-killed cultures engendered no immunity. Five species of South African rodents—*Otomys tropicalis pretoriae*, *Mastomys coucha*, *Mystromys albicaudatus*, *Tatera brantsi*, *Rhabdomys pumilio*—were shown to be susceptible. *S. P. Bedson.*

DENNISON, W. M. & DICK, A. L. **Surgery in West Africa : Experiences in a Military Hospital.** *J. Roy. Army Med. Corps.* 1944, Mar., v. 82, No. 3, 112–24, 2 figs.

The hospital served a large Africa recruit training centre. There was practically no " war surgery," and cases were mostly of the minor civilian type, though disabling. Almost 80 per cent. were " pyogenic," though the incidence of accidental infection in hospital was no higher than at home.

Tropical Myositis affecting one or more of the larger muscles, usually in the thighs, was invariably due to *Staphylococcus aureus* or *albus*. *Mf. bancrofti* were found in the blood of 40 per cent. of these cases, and many had septic skin infections ; 5 per cent. developed pyaemia. Half the cases resolved without abscess formation on sulphathiazol in doses of 6–12 gm. in 24 hours [dose stated in text as 6–12 mgm. is surely an error]. Secondary anaemia was a notable feature in severe cases.

Stamp Foot, or infected haematoma of the sole, was commonly caused by drilling for duty or pleasure by enthusiastic bootless recruits.

Crab Yaws was not easy to diagnose, but tender nodules in the soles irrespective of fissures and spongy heels, could be cured by N.A.B. with or without Sobita, combined with large doses (up to 90 grains daily) of potassium iodide.

Tropical Ulcers, mostly on lower limbs, usually showed Vincent's spirochaetes. Excision proved more effective than closed plaster or elastoplast methods, which, in the author's opinion, usually cause extension of the ulcer. [No mention is made of simple curettage with a sharp spoon, followed by the application of iodoform, usually the most successful and time-saving treatment.]

Filariasis. A few of the symptoms associated with *Wuchereria bancrofti* and *Loa loa* are described. *Onchocerca volvulus* tumours were frequently met with, though no reference to ocular symptoms or skin lesions is made. The dangers of winding out Guinea worm are stressed [but no reference is made to phenothiazine injection treatment].

Amoebiasis. Two cases of liver abscess required operation after emetine treatment and needling. Four patients with masses in the right iliac fossa simulating appendicitis came to laparotomy. In each there was an abscess not due to the appendix or to obvious perforation. There was a history of dysentery in all and in three *E. histolytica* was found in the stools. They are regarded as abscesses following dysenteric ulceration of the caecal region.

Not one confirmed case of appendicitis was reported.

There are orthodox notes on snake bite and scorpion sting, the latter always relieved by injection of a local anaesthetic.

Various other not specifically tropical conditions are discussed, and a warning that even in Africa "common things most commonly occur" and that obscure explanations should not always be sought for.

C. C. Chesterman.

GRINDLAY, J. H. **Treatment of Skin Infections in the Assam-Burma Jungle.** *Bull. U.S. Army Med. Dept.* 1944, Mar., No. 74, 74–80, 1 fig.

For wounds and infections of the skin the author advises that ointment should never be used in the tropical conditions of Assam and Burma, because the greasy base prevents normal drying of the skin and encourages maceration of cornified epithelium by sweat, thus creating conditions suitable for the spread of infection. Small traumatic wounds should be cleaned with soap and water and a stiff brush, should be painted with picric acid or tincture of mercurochrome, and covered. To clean an infected small wound, a continuous wet dressing of 50 per cent. magnesium sulphate in glycerin is advocated, the dressing being kept wet with 50 per cent. watery solution.

Most of this paper is concerned with tropical ulcer (Naga sore). The author inclines to the belief that this condition is related to beriberi; both occur in the monsoon season, signs of beriberi are common in those suffering from ulcer; brewer's yeast and thiamin are helpful in treatment. Tropical ulcer usually arises in a small abrasion or insect bite, most commonly a leech bite; its course may be acute and fulminating, with destruction of tissue down to periosteum. Treatment should include treatment of any coincident systemic disease such as malaria or dysentery.

For the fulminating ulcers the patient should be in hospital, and all necrotic material should be cut or scraped away, or the crater excised ; thereafter a large gauze sponge, soaked in magnesium sulphate solution, is bound on to the wound. This is kept wet and changed daily. For the deeper and more acute ulcers, after excision, sulphanilamide powder may be rubbed into the tissues and the wound packed with vaseline gauze ; a large gauze dressing, with iodoform to reduce offensive odour, is then placed in the wound and a plaster of Paris casing applied to the leg and foot ; this should be changed in three weeks. Skin grafts may be applied in the healing stage.

Chronic ulcers may be dealt with by curetting or by cauterization with phenol or copper sulphate, after which magnesium sulphate dressings may be applied, or the plaster technique described above may be used. *Charles Wilcocks.*

SHIRCORE, J. O. **The Treatment of Tropical Ulcers and other Skin Affections with locally prepared Acriflavin-Kaolin Powder.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Mar., v. 37, No. 5, 345–6.

To save materials, the author has made use of the local kaolinitic earth of Nyasaland. The earth is pounded and then stirred with water ; the supernatant fluid, containing the clay, is poured off, and in a few hours the fine white powder is deposited. This is collected and fire-dried, the resulting hard cake being ground to powder. To ½ lb. of this are added two soluble tablets (each of 1·75 grains) of acriflavin ; the mixture is again fire-dried and pulverized, when " a fine, sterile, ochre-coloured product is obtained." In that district, 50 lb. of crude earth yield 4 lb. of fine powder.

The powder is dusted on to the ulcer after preliminary irrigation with 1 in 1,000 potassium permanganate lotion, and the ulcer is closed with lint wrung out of sterile ground-nut oil. This procedure is repeated every other day ; foul ulcers are rapidly cleaned and patients express relief from pain. When definite signs of healing appear this treatment is discontinued, and boric and zinc ointment mixtures, or the latter alone, are used. The method is simple and effective.

Charles Wilcocks.

SIMPSON, T. **Lobar Pneumonia in African Soldiers.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, May, v. 37, No. 6, 399–407. [10 refs.]

Between November 1941 and June 1942 the author had under his observation 159 cases of lobar pneumonia and 66 of " atypical " pneumonia. When first seen, those seriously ill were given sulphapyridine, 2 gm. at once, 1 gm. two hours later, then 1 gm. four-hourly till the temperature became normal, and then 1·5 gm. daily. Others, if their condition deteriorated, were given the drug later. Fifty-nine of the patients were attacked by type-5 pneumococcus, 1 in March, 5 in April, 41 in May and 12 in June, but contact seemed to play no part for cases arose in different phases and in different camps at the same time. Their stay in hospital was 19 to 23 days. The commonest complications of 41 who had sulphapyridine from the onset were malaria (9), empyema (3), pericarditis (2), jaundice (2). Of 47 who were given sulphapyridine later 16 had jaundice, four pleural effusion, and one each malaria and peritonitis ; of 71 having no sulphapyridine, two

had malaria, two effusion, six jaundice and one peritonitis. One of the pericarditis patients died.

Among the 59 type-5 cases there were no deaths. The commonest complications were jaundice (11), pleural effusion (4), empyema (3); in four resolution was delayed. Six patients did not respond to sulphapyridine, although "there were no obvious complications." [Presumably the author means when they were first seen, for he goes on to say, "Two developed fatal complications, meningitis and pericarditis. . . " and two others had tuberculosis also. Another had "an unsuspected small pleural effusion."] In the author's view, if no response to sulphapyridine is shown in 48 hours, judging by the temperature chart, the drug should be discontinued. [Two other consecutive sentences are a little difficult to reconcile. The author states: "The low mortality in the severely ill, or 'sulphapyridine from the onset' group was undoubtedly due to the drug." The sentence preceding this runs thus: "The vast majority of cases recovered in spite of sulphapyridine therapy and even though cases were left until they had to have specific drug therapy the mortality, complications and response to the drug were not altered."]

H. Harold Scott.

STACEY, R. S. **Portal Cirrhosis in Iraq.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, May, v. 37, No. 6, 387–98, 1 graph. [30 refs.]

The aetiology of cirrhosis of the liver in the Middle and Far East is very puzzling and any serious attempt to solve the difficulty is to be welcomed. The author's studies reported in this article were based on 127 cases personally investigated. All but two of the patients belonged to the poorest classes—fellaheen, labourers, brickmakers, pedlars. Men seemed to suffer in greater numbers than women, but no reliable figures can be given because women are reluctant to come to hospital. Most of the patients are between 30 and 40 years of age. The earlier stages are rarely seen because patients do not apply for treatment until ascites interferes with their ability to work. Fever and chills often precede the abdominal distension; repeated tapping may be needed, up to 50 times. About two-thirds have oedema of the legs, thighs, abdominal walls, genitalia and back; in some this is ascribable to pressure on abdominal veins, but not in all, for the oedema may precede the abdominal distension and the oedema may not be relieved by tapping; moreover, dilated veins of a collateral circulation are not commonly seen. The oedema in some, at least, is more likely due to lowering of plasma osmotic pressure from the liver damage. Wasting is marked in the later stages. The liver is not enlarged and the average weight at autopsy was 1,063 gm.; the spleen is enlarged in 65 per cent. of cases; it is hard, not tender, and the average weight was 826 gm. Jaundice is far from common and fever to 38·5°C. is present for short periods only, a few days to two or three weeks and only in some of the patients. There is no tendency to haemorrhage or marked gastro-intestinal disturbance. Evidence of syphilis was slight and the W.R. was positive in less than one-third of the patients. The formol-gel reaction was strongly positive in 68 per cent., negative in 11 per cent., weakly positive (*i.e.* the serum became semisolid) in 21 per cent. The serum euglobulin value (expressed as tyrosine) was above 60 in 96 per cent. of these cases, whereas in a control group it was below this in 95 per cent. It is known that the euglobulin is raised in

malaria, kala azar, amoebic hepatitis and other conditions so that all that can be claimed from this at present is that " a case of ascites having a normal euglobulin is unlikely to be one of portal cirrhosis."

Histologically, nothing characteristic is seen ; there is no indication that *Schistosoma* plays any part. An interesting tabular presentation of the similarities and differences between portal cirrhosis in western countries and in Iraq is given.

Food is not a likely cause ; alcohol is rarely taken, avitaminosis is uncommon ; intestinal helminthic parasites were considerably less prevalent in these persons than in 1,000 persons in apparent health ; there was no reason to incriminate malaria ; kala azar does not occur in Iraq. A survey of the likely causes reveals only one factor common to all cases—poverty, and it is thought that restricted diet, deficiency of proteins, causes the liver to be unduly vulnerable to poisons as MILLER and WHIPPLE [*J. Exper. Med.*, 1942, v. 76, 421] have shown. [A vague and not very satisfying conclusion.] *H. Harold Scott.*

BERLIN, C. **Behcet's Syndrome with Involvement of the Central Nervous System. Report of a Case, with Necropsy, of Lesions of the Mouth, Genitalia and Eyes : Review of the Literature.** *Arch. Dermat. & Syph.* 1944, Apr., v. 49, No. 4, 227–33, 5 figs. [Refs. in footnotes.]

This very chronic disease—it lasts for years—was described in 1937 by Hulusi BEHCET, a Turkish dermatologist (*Dermat. Woch.*, 1937, v. 105, 1152), but was probably observed a few years earlier, and other cases have been reported since. In addition to a case which the author had under observation and treatment for four and a-half years, he has collected records of 12 others published in the period 1931–1941 ; nine of these 13 cases were in males aged 20–40 years.

The disease is characterized by recurrent attacks of aphtha-like lesions in the mouth and on the external genitals together with various ocular lesions. The first signs usually appear in the third decade of life though in one patient they appeared at nine years. The symptoms occur in attacks which develop suddenly without apparent cause and without seasonal incidence and vary in number from several to many in a year ; they last for one to four weeks. The mouth and genitalia are usually affected first and together, the eye lesions appearing some years later ; various forms of eye disease may be present but the chief condition is a chronic recurrent hypopyon-iritis which is sometimes accompanied by uveitis and neuritis. Other skin lesions are associated with the disease, particularly erythema nodosum (in five of the 13 cases). The prognosis is poor, no case of recovery having been reported and none of the many kinds of treatment that have been tried has given more than temporary relief.

The author's patient was a 20-year-old Jewish labourer, born in Palestine ; he was first seen at the Hadassah Hospital, Tel Aviv, on November 3rd, 1935, and gave a history of having had soreness of the mouth and genitalia for a year previously. He had about a dozen small ulcers, about the size of a lentil, on the mucous membrane of the lips, tongue and buccal cavity, and an ulcer, about 15 mm. wide, on the glans penis ; on his legs there was a " furuncle-like folliculitis," and there were many scattered scars which he said were the result of boils. His eyes became affected early in 1938, the diagnosis being

iridocyclitis with recurrent hypopyon and haemorrhagic retino-neuritis. In December 1939 he was said to have become depressed and to have developed severe headaches and dizziness ; in March 1940 convulsions appeared, at irregular intervals, and he was admitted to the hospital in a state of unconsciousness on March 20th and died on March 24th, 1940. The cerebrospinal fluid, examined before death, showed 95 cells per cmm. (40 polymorphonuclears, 55 lymphocytes), weakly positive Nonne-Apelt reaction, positive Pandy test, protein 49 mgm. per 100 cc., and negative Wassermann reaction.

A *post-mortem* examination was made ; the meninges at the base of the brain were thickened and small foci of softening were seen near the substantia nigra ; microscopic sections showed perivascular infiltrations of round cells, scattered old necrotic foci with pseudoxanthoma cells in the substantia nigra, and round cell infiltration around the central artery of the retina in the optic nerve and in the choroid coat of the eye. The other organs of the body showed little change.

The author states that the cause of the syndrome is unknown but that it has a clear relationship to ulcus vulvae acutum (Lipschütz) which is a general disease with a tendency to form metastases.

J. F. Corson.

PATRICK, F. L. L. **Combined Use of Sodium Evipan and Luminal in Tetanus.** *Caribbean Med. J.* 1944, v. 6, No. 1, 50–53.

According to hospital returns, tetanus in Trinidad has a fatality rate of about 60 per cent., one reason being that patients do not usually present themselves for treatment till they have been ill for four days or so. The author records four cases under his care, two of them mild, which cleared up uneventfully after injection of a single dose of 40,000 units of antitoxin. The other two were more severe, with spasms recurring every few minutes.

The first was a woman of 21 years who, in the course of ten days, received 80,000 units of antitoxin intravenously and 50,000 intramuscularly, and 28 grains of luminal in 2-grain doses and 8 gm. of sodium evipan in 1-gm. doses intravenously. A fortnight after the last dose the patient was discharged cured. The second was a lad of 15 years with a wound of his right foot ; his symptoms began four days before admission and his spasms were recurring every ten minutes. He was given 60,000 units of antitoxin intravenously at once on being seen ; 16 days later he had another 20,000 units. For the rest, treatment consisted of luminal, 1 grain daily (on two days 2 grains), a total of 12 grains being given, and sodium evipan intravenously, two doses of 1·5 gm. two days after admission, then 1 gm. daily for three days, followed by 0·5 gm. daily for three more days, 7·5 gm. in all. Recovery was uneventful. As noted by the author, Vigors EARLE in 1939 reported five cures out of six cases treated with sodium evipan and antitoxin.

H. Harold Scott.

MIDDLEKAUFF, W. W. & CARPENTER, S. J. **New Distribution Records for the Mosquitoes of the Southeastern United States in 1943.** *J. Econom. Entom.* 1944, Feb., v. 37, No. 1, 88–92.

CERQUEIRA, N. L. Lista dos mosquitos da Bolivia (Diptera, Culicidae). [**The Mosquitoes of Bolivia.**] *Mem. Inst. Oswaldo Cruz.* 1943, Aug., v. 39, No. 1, 15–36, 2 figs. (1 map). English summary.

CERQUEIRA, N. L. Algumas espécies novas da Bolivia, e referência a três espécies de Haemagogus (Diptera, Culicidae). [**Three New Species of *Haemagogus* in Bolivia.**] *Mem. Inst. Oswaldo Cruz.* 1943, Aug., v. 39, No. 1, 1–14, 25 figs. on 4 pls. English summary.

HERRLICH, A. & LIEBMANN, H. Zur Kenntnis der menschlichen Coccidien. [**The Coccidia of Man.**] *Ztschr. f. Hyg. u. Infektionskr.* 1943, Nov. 20, v. 125, No. 3/4, 331–63, 9 figs. [Numerous refs.]

Having encountered cases of human coccidiosis in N. Africa, the authors have been able to study in detail the development of the oöcysts. In 26 cases the oöcysts as passed in the stools were undeveloped, and corresponded with those which have been recorded from many parts of the world. The authors have been able to observe the influence of temperature and *p*H of the faeces on the rate of development, and to describe a number of abnormalities not hitherto recorded.

In one case, the twenty-seventh, they have been able to repeat an observation made by REICHENOW in 1925 [this *Bulletin*, 1925, v. 22, 843]. They found in the fresh stool a single pair of fully developed sporocysts adherent to one another, or kept in position by relics of a membrane which could not be clearly distinguished. They adopt the view, as Reichenow did, that these sporocysts are from a coccidium which has developed to maturity in the subepithelial tissues of the intestine, as does *Isospora bigemina* of cats. This being so, they hold that it is *Isospora hominis*, the species originally recorded by VIRCHOW, and that the form observed in the 26 other cases in which undeveloped oöcysts are passed is a distinct species, *Isospora belli* WENYON.

This paper is a long one, which reviews the entire literature of the subject without adding to existing knowledge beyond certain details of the development of the oöcysts. *C. M. Wenyon.*

MORTON, T. C. **Heat Effects in British Service Personnel in Iraq.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, May, v. 37, No. 6, 347–62, 4 graphs & 2 charts. Discussion 362–72 [SACHS, A.; DREW, R.; BUXTON, P. A.; JAMES, S. P.; WATERLOW, J.; LADELL, W. S. S.; POTTER, L.; BIGGAM, A. G.; MCARDLE, B.; SCOTT, H. H.; MORTON, T. C. (in reply)].

This paper is based on the experience of several summers in Iraq. In July and August the shade temperature often rises above 120°F.; there is a considerable fall at night, and the humidity is low. In discussing aetiology, the author stresses the cumulative action of heat, as a result of which the greatest incidence of casualties occurs on the third or fourth day of a heat wave. [This point is of importance for prophylaxis.] He goes on to say: "meteorological factors such as humidity play an important part as regards the suppression of sweating, and the heat hyperpyrexia syndrome will always be common in humid areas such as Basrah, whilst heat cramps are more common in hot dry areas." [This statement is not supported by evidence in the paper. Information about the relative incidence of various types of effects of heat in climates of different humidity, is incomplete in the literature, and is much needed.] Other aetiological points mentioned are lack of acclimatization, and salt deficiency.

Cases of effects of heat are divided into three groups—syncope, heat exhaustion, and heat hyperpyrexia. Syncope is briefly dismissed, as a temporary cardio-vascular collapse, without reduction of urinary chlorides. The description of heat exhaustion is drawn from a series of 30 cases. These subjects tended to be of a particular type—lean, nervous men, with a low blood-pressure, usually sedentary workers. One-third of these patients were teetotallers, and two-thirds were in their first hot season. The leading symptoms were nausea and vomiting, dizziness, constipation, and cramps. Sweating was profuse, and the urine volume diminished. The blood pressure was in many cases low but the figures quoted show that this was not invariable. It is stated that the urinary chlorides were in all cases much reduced, but figures are not given. Estimation of urinary chloride by the simple test of Fantus is considered to be of value for differential diagnosis, *e.g.*, from vomiting caused by surgical conditions. For the treatment of these cases, the author advises copious fluids, containing glucose and sodium chloride ; if these cannot be retained by mouth, 0·9 per cent. NaCl should be given intravenously. Results with this treatment were excellent.

Eleven cases of hyperpyrexia are described. Here again the impression was formed that a particular type of individual was most at risk —the obese man with a high blood-pressure. Alcohol and sepsis were predisposing factors. In all cases there was prodromal malaise, followed by an acute onset. The outstanding sign in the early stages was anhidrosis. In contrast to the usual description, frequency of micturition was present in one case only. Delirium and coma followed in half the patients—those with a temperature of more than 108°F. Vomiting and convulsions were also common. The knee-jerks were invariably either diminished or lost. There was no suppression of urine ; chlorides were diminished in all cases examined. [Again, no figures are given.] The treatment of these patients followed standard lines ; after reduction of body temperature by fans and iced water to 102–103°F., they were transferred to an air-conditioned ward at a temperature of about 75°F. In this environment, a second cold sponging was never necessary, whereas in an ordinary ward there is a constant danger of a recurrence of hyperpyrexia. For this reason, the transition from air-conditioned to ordinary ward should be gradual. Intravenous saline was not given, as there were no signs of dehydration. Convulsions and venous congestion were treated by venesection. Mag. sulph. enemata were of value in controlling headache during convalescence. Lumbar puncture is not recommended as a routine measure ; in one fatal case, the C.S.F. was under pressure, but otherwise normal. Two other patients died, out of the 11 in the series.

The author recommends three sets of prophylactic measures :

1. *Acclimatization.*—Men arriving during the hot season should be protected from all avoidable stress, *e.g.*, at disembarkation.
2. *Air-conditioning.*—Cool rest-rooms would prevent the cumulative effects of heat.
3. *Increasing salt and water intake.*—The necessary amount of salt is put at ¾–1 oz. per day, and of water at 1–2 gallons per man per day. [It is doubtful whether these levels are high enough to provide a margin of safety in all cases.] It is recommended that salt (a mixture of NaCl and KCl in the proportions 3 : 2) should be added to drinking water—about 1 oz. of salt mixture to

five pints of water. [The rationale of giving potassium in such large amounts is not clear, since this cation is present in only low concentration in the extracellular body fluids, and may act as a diuretic if given in large doses. In addition, most animal and vegetable foods contain relatively large amounts of potassium, but little sodium.]

The discussion that followed was opened by Col. A. SACHS. He had noted that Indian troops were not immune to effects of heat, and that though the incidence among them was lower than in Europeans, the case mortality was higher. In the Persia and Iraq Force it was found that men were kept fitter by making reveille an hour later, and so giving them an hour's extra sleep. The output in workshops was not diminished, although the working day was shortened. This is in contrast to the recommendations of Air Commodore MORTON, who said that good results were obtained by adjusting working hours so that men started an hour earlier, and stopped at 11.30 a.m. [It is evident that this important question, of the optimum hours of work in hot climates, has not yet received a clear answer.] Mention was then made of a type of case that has been called subacute effects of heat. These cases began with an apyrexial stage, with indeterminate features, and the patients later developed mental symptoms and hyperpyrexia. They were difficult to diagnose, and the prognosis was worse than in acute heatstroke.

Col. SACHS summarized the pathological findings in fatal cases of effects of heat. In hyperpyrexia there was peripheral congestion, and petechial haemorrhages in the brain and beneath the serous membranes. There was intense congestion of stomach and upper intestine; the lungs were haemorrhagic, and the heart contracted. Microscopically, there were degenerative changes of parenchymal cells, and coarse granular pigmentation throughout the organs. In the brain there was oedema, perivascular and perineural; the vessels were swollen and hyaline, with many thrombosed capillaries; in some treated cases there was an increased cellular content, attributed to proliferation of neuroglia and microglia. In the lungs there was haemorrhagic oedema, similar to that of early phosgene poisoning. It was suggested that there might be a relation between these pathological changes and anoxaemia.

Most of the rest of the discussion centred round two points: acclimatization to heat, and protection from heat. Lt. Col. R. DREW stressed the importance of acclimatization, and asked whether people lost less salt in their sweat after living in a hot climate. Dr. W. S. S. LADELL said that in 24 soldiers, during the summer in Iraq, the average sodium chloride content of the sweat was 0·25 per cent. This figure was in close agreement with all the recorded figures, in temperate as well as in hot climates. The soldiers were acclimatized, yet they were producing sweat with the same salt content as the unacclimatized. Dr. LADELL thought that the view that acclimatization leads to a loss of less salt in the sweat could not be upheld. Dr. B. MCARDLE said that one change during acclimatization was an earlier onset of sweating. The acclimatized man began to sweat with a much smaller rise in rectal temperature than the unacclimatized. He also sweated more profusely, and expended less energy for a given amount of work. The blood-flow to the skin was increased, leading to a higher skin temperature, and a greater rate of evaporation.

In discussing protection from heat, Professor P. A. BUXTON described topees, spine-pads, and red shirts as "superstitions," and, in contrast, stressed the importance and practicability of air-conditioned buildings. He pointed out the great danger, in hot climates, of excessive bandaging of surgical cases. Col. S. P. JAMES asked whether the authorities had modified their views about sun-helmets and spinal pads, and whether these "excellent precautions" had been abandoned. He asked if it was now thought that a man could become immune to heatstroke by exposing his bare head and naked body to the Indian sun. Dr. J. WATERLOW said that in Iraq he had made some measurements of the area of the body shaded by the topee, and found that at midday it was about 16 per cent. Most of the shaded area, as well as the rest of the body, was still receiving radiation from the surrounding desert, at a surface temperature of 160°F.

Air Commodore MORTON, in summing up, recommended that topees should be worn in a climate such as that of Iraq, but he did not think that spinal pads were necessary. He thought that thick boots tended to raise the body temperature.

[The discussion as a whole, and the contradictory examples of personal and other experiences given in the course of it, showed that there is still much divergence of opinion about the practical value of sun-helmets and protective clothing.] *J. Waterlow.*

WOLKIN, J., GOODMAN, J. I. & KELLEY, W. E. **Failure of the Sweat Mechanism in the Desert. Thermogenic Anhidrosis.** *J. Amer. Med. Ass.* 1944, Feb. 19, v. 124, No. 8, 478–82, 5 figs.

The authors studied a syndrome involving failure of the normal sweat mechanism, consequent on exposure to extreme heat. They believe the syndrome to differ from heat-stroke and heat-exhaustion. The patients were eight soldiers engaged in normal military training in the American desert area.

Typically there was a history of a rather sudden onset of generalized weakness, subjective warmth and discomfort, dizziness, "all-in" feeling, headache and shakiness. These symptoms occurred during exposure to sunlight, either with or without physical exertion. With the onset of these symptoms there was, in each case, a cessation of sweating; and in several cases this was preceded by profuse sweating during a period varying from a few days to several weeks. In each case the cessation of sweating affected the body region below the neck, while there was profuse sweating of the face and neck. From the neck downwards the skin was warm and dry and had the appearance of goose flesh. This "papular eruption" was not transient, and in some of the cases of longer standing there was a fine desquamation. As the condition improved, the skin resumed its normal appearance. Generally the mouth temperature was below 99°F., except when the temperature of the environment was 120°F. or more; and then complaints of discomfort, a feeling of extreme heat, and irritability, were offered. As a rule the patients responded readily to rest in a cool environment.

Areas on which sweating occurred were demonstrated by the starch-iodine method. When cholinergic drugs (pilocarpine and mecholyl) were injected hypodermically the sweating response was parallel with that produced by exposure to heat—excessive sweating of neck and head, and almost complete absence of sweating below the neck. When

the patients had recovered and sweated normally in response to heat, they were again tested with mecholyl and they then showed a normal sweat pattern.

Detailed case reports are given. The hyperpyrexia, coma, rapid pulse, and increased respiration rate associated with heat-stroke were absent, nor were the cold clammy skin and signs of shock typical of heat-exhaustion present. During two months (July to September, 1943) in one hospital there were 77 patients with some form of heat disorder, and three of these were unquestionably cases of heat-stroke. Many of the others had been evacuated before this syndrome of failure of sweating had been noted, but it is thought that there must have been many other such cases besides the eight here reported.

All the subjects had previously been seen in battalion stations, and all were given salt therapy. It was only after the failure of this that they were admitted to hospital. It is thought that salt intake and excretion play at most an insignificant part. Laboratory data were obtained from 20 of the 77 patients admitted with heat disorders. Four of the eight patients with failure of sweating were included in this series, and each of them had a normal blood chloride concentration, as had all those with heat-stroke or heat-exhaustion.

The authors make the suggestion that the initial excessive sweating may perhaps be thought of as an overtaxing of the heat-regulating mechanism to such an extent that a temporary functional " paralysis " is caused. They are inclined to the view that, even after recovery, the patients should not return to extremely hot climates. *T. Bedford.*

MILLER, M. M., SILVERMAN, J. J. & POWELL, V. E. **Failure of the Sweat Mechanism in the Desert.** [Correspondence.] *J. Amer. Med. Ass.* 1944, Apr. 15, v. 124, No. 16, 1152.

BLANK, H. **Anhidrosis following Exposure to Extreme Heat.** [Correspondence.] *Ibid.* 1152–3.

The writers of these letters discuss the foregoing paper by WOLKIN, GOODMAN and KELLEY. Miller remarks that anhidrosis is most frequently associated with chloride deprivation and dehydration, and says that since the major part of the sodium chloride content of the body is to be found in the tissues, a considerable amount of chlorides can probably be lost without a corresponding lowering of the blood chloride level, which level the organism strives to maintain. WOLKIN and his colleagues apparently assume that a normal blood chloride level justified the conclusion that there was no chloride deficiency. But Miller points out that in one of the cases reported in their paper a satisfactory minimum replacement of the chloride loss (2,000 cc. of 5 per cent. dextrose in isotonic solution of sodium chloride) had been given on admission, and that this was followed by a prompt remission of clinical symptoms, with a return to normal sweat function within 24 hours. All their patients were given 4–6 gm. of salt orally each day, besides using drinking water containing 0·1 per cent. of sodium chloride, but this failed to relieve the symptoms. Miller points out that most authors agree that such patients should receive at least 25 gm. of sodium chloride in the first 24 hours, preferably as isotonic solution intravenously, in addition to the oral intake, and he adds that under desert conditions this seems to be a minimum requirement in cases of severe salt depletion.

Concerning the authors' finding that following recovery of the sweating function the symptoms could not be provoked by temporary exposure to excessive heat, Miller suggests that by that time their salt depletion and dehydration had been wholly or partially made good. The conclusion that salt is not indicated and is of no therapeutic value in such cases is described as a dangerous assumption.

Silverman and Powell feel that the syndrome described is fundamentally a psychosomatic phenomenon, and that the inhibition of sweating is secondary. They mention that the anxiety state may, during extreme elevations of temperature, inhibit both palmar and general body sweating. They find the limitation of sweating to the face and neck difficult to explain, but say that the possibility of local reflex action cannot be excluded. The symptoms described in the case reports, " shaky and weak," " head whirling," and so on, are said to be suggestive of a psychogenic factor. The operation of psychic influences would explain the absence of any disturbance in blood chlorides.

Blank refers to a case of this syndrome studied in Louisiana during the summer of 1943. This man presented a picture identical with that described by Wolkin and his colleagues. The local skin changes are emphasized. Besides the papular lesions which the authors describe, this patient developed over the extensor surfaces of his limbs and on his trunk another distinct dermatosis. It consisted of superficial, more or less circinate areas of slight erythema with moderate white scaling and mild pruritus. The scaling was patchy and similar to ichthyosis, but was easily distinguished from congenital ichthyosis. About 20 other patients were seen for a skin disease identical in distribution, appearance and symptoms with that described. None of these patients, as far as was known, had experienced " thermal anhidrosis," but all had spent the summer in Louisiana and had been exposed to high temperatures. In each case a diagnosis of asteatosis was made, and it was felt that the condition might be a late sequela of prickly heat. Relief was obtained by using plain greasy ointments.

T. Bedford.

BOOK REVIEWS.

Bercovitz, Z. Taylor [M.D., Ph.D., F.A.C.P., etc.] [Edited by]. **Clinical Tropical Medicine.** By Twenty-Seven Authors. With a Foreword by Wilbur A. Sawyer, M.D., Director, International Health Division, Rockefeller Foundation. pp. xvii+957, 121 figs. & 19 pls. (5 coloured). 1944. New York & London: Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers. [£3 10s.]

This beautifully produced volume is the work of 27 authors, among whom are some of the most distinguished of American medical men. It is a textbook of clinical medicine, as its title states, and it is written throughout in plain, easy style, with a somewhat dogmatic trend which would be appreciated by the student new to the subject. There are sections on the diarrhoeal diseases; diseases caused by blood protozoa, by spirochaetes and spirilla, by Rickettsiae, by viruses, and by bacteria; nutritional diseases; diseases caused by yeasts and fungi; infections with helminths; tropical snakes and poisonous insects; and the effects of heat, hygiene, and sanitation.

An author who sets out to deal with clinical medicine may be justified in omitting more than scant reference to epidemiology and the public health measures of control, but in reading this book the reviewer was impressed with the superiority of those chapters in which more than cursory reference had been made to these matters. Most medical men who work in the tropics feel the need of epidemiological instruction, and, indeed, are called upon to advise on control, and it is on these matters that they find the greatest difficulty in securing the compact type of information that could be given in a text book.

Nevertheless, this book contains much that is valuable to the student and to the practitioner, and the presentation is clear. Modern advances in all branches of clinical medicine are referred to, but the use of sulphonamides in plague deserves more favourable notice than is here given. No reference is made to DOBELL's recent work on *Dientamoeba fragilis* [this *Bulletin*, 1941, v. 38, 422] in which he suggests that this protozoon is more alive to the flagellates than to the amoebae. The classical criteria of HEIBERG and of GARDNER and VENKATRAMAN in the diagnosis of the cholera vibrio are not described, nor is reference made to the different strains of the vibrio, though these are important in the preparation of vaccines, or to the El Tor and Celebes strains. Without these references the reader would be under the impression that cholera is a simpler disease than, in fact, it is.

The author of the chapter on malaria is critical of the short courses of treatment which have recently been in fashion; with regard to quinine, he says that its efficacy is undoubted if it is given over a sufficient period of time, but that "if given for a short time only, it is so ineffective that from 70 to 80 per cent. of cases will relapse." In making this remark he does not differentiate between *P. vivax* and *P. falciparum* infections, which is surely of first importance in the question of relapse. He advises a course of quinine lasting eight weeks. The dose of mepacrine recommended is 0·3 gm. daily by mouth, or, for pernicious infections, 0·1 to 0·2 gm. daily by the intravenous route. No indication is given that the oral dose may be substantially increased during the first 24 or 48 hours, with advantage, especially in such hyperendemic areas of *P. falciparum* infection as East and West Africa. The statement that "A dosage of atabrine 0·1 gm. three times weekly, will keep the incidence of acute malaria at the minimum" will not be acceptable to many military medical officers in hyperendemic zones. To the reviewer it seems that the treatment and suppressive treatment of malaria are subjects still too controversial to be satisfactorily disposed of so briefly as is here attempted.

Though in parts of this book this tendency to over-simplification is evident, there are other chapters which could hardly be bettered, for instance that on yellow fever by SOPER, and the section on helminths by SCOTT and BERCOVITZ (though the remark that sand filters, if well managed, make water practically safe from the cercariae of schistosomes may be disputed, see WITENBERG and YOFE, this *Bulletin*, 1938, v. 35, 600). The remark, in the section on heat cramps, that "it has been estimated that 1 gm. of sodium chloride daily is necessary for those engaged in hard labor in hot weather" seems to be inadequate when 10 gm. or more are normally excreted daily in the urine, and 10 gm. may easily be lost in sweat in a hot country.

The book is printed on heavy art paper throughout, and is illustrated by a series of superbly reproduced photographs.

Charles Wilcocks.

CHESTERMAN, Clement C. [O.B.E., M.D. (Lond.), M.R.C.P., D.T.M. & H. (Camb.), etc.]. **Tropical Dispensary Handbook. An Aid to the Training and Practice of Native Medical Assistants and for the Guidance of all engaged in Medical Practice in Rural Dispensaries in the Tropics.** Fourth Edition, Revised. pp. xi+299, 19 pls. (2 coloured). 1944. London & Redhill: United Society for Christian Literature, Lutterworth Press. [10*s.*]

The teaching of medicine is notoriously difficult, and, like the teacher of medicine, the writer of a text-book is faced with the problem of what to leave out, bearing in mind the educational standard of the persons for whom the book is intended. This book was written for the use of native dispensers, and assumes that they have already received instruction in anatomy and physiology; it is not concerned with hygiene, nursing, maternity and infant welfare, since suitable text-books on these subjects already exist. The author makes the point that more and more use is being made of native dispensers throughout the tropics, and there is, therefore, urgent need to ensure that the teaching of these dispensers is adequate to their needs; his book is intended for use in addition to the lectures of any course of instruction, and as a reference book to which the dispenser can turn at need. That the fourth edition has been called for is a sign that the author has succeeded in his object, and no doubt his experience in the training of dispensers has given him a clear conception of their needs and capacities.

The information given is accurate and concise. In this edition, only essential new matter has been incorporated; for instance, the sulphonamide treatment of plague, the use of gentian violet for *Enterobius* infections, and the treatment of sleeping sickness with the aromatic diamidines are referred to. Criticism may be made of minor points: On page 115 no mention is made of lean meat (as distinct from animal fat) as a source of vitamins, or of palm oil as a source of vitamin A; on page 81 it is stated that various vaccines are used for the prevention of bacillary dysentery; on page 46 Brill's disease is used as a synonym for murine typhus. But these are minor points which would not seriously affect the student.

The author might, however, consider the suggestion that for the full appreciation of the relationship of man to the parasites of disease, which would probably go far towards digesting in the student's mind a mass of apparently unrelated facts, sections could be added on the biological position and features of bacteria, protozoa and the worms, and on the modes of transmission of the diseases in nature. It is true that much of this information is contained in various parts of the book, but it is the reviewer's opinion that an organized introduction on these lines would give the pupil a most helpful start to his lectures and reading. In the section on inflammation in general the author has, in fact, given an introduction to the surgical diseases, which forms a basis comparable, in its way, to that now suggested.

The Tropical Dispensary Handbook covers the fevers (including the tropical fevers), diseases of the various systems, helminthic and deficiency diseases, skin diseases and miscellaneous disorders; inflammation, wounds, injuries and surgical diseases, with a chapter on the eye and one on minor surgery. There is a section on pharmacology and one on laboratory notes. It may be confidently recommended to those who undertake the important work of instructing native dispensers; it can be relied upon to cover the ground thoroughly and to find perhaps its greatest use as a book of reference to the dispensers working, after qualification, in their own districts. *Charles Wilcocks.*

BIRAUD, Yves [M.S., M.D., M.P.H.]. **Polyglot Glossary of Communicable Diseases. Contribution to the International Nomenclature of Diseases.** Reprinted from *Bull. Health Organisation* (League of Nations). 1943–44, v. 10, No. 3, 202–556. [Published by Allen & Unwin (League of Nations Publications Dept.) 40 Museum Street, W.C.1. [4*s*.] [Review appears also in *Bulletin of Hygiene*.]

Names of diseases in different languages often present sufficient resemblances to facilitate their translation from one language to another, but there are instances of words identical, or nearly identical, in form having been used in different countries to name diseases that are not the same. This is but one of the drawbacks of a nomenclature that has been allowed to grow, without recognized rules, until it has become many times greater and much more confused than it should be.

Dr. Yves Biraud, Head of the Service of Epidemiological Intelligence and Public Health Statistics of the League of Nations, having experienced the difficulties of interpreting the national terms for diseases, has compiled for the help of others a most useful polyglot glossary of the names of communicable diseases as found in official publications, medical literature and common speech in 24 European languages.

In this 250-paged glossary he gives, in a series of parallel columns, first the standard French nomenclature of the Detailed International List of Causes of Death (1938), then the corresponding Latin terms, after which come columns with the German, English, Bulgarian, Danish and Norwegian, Spanish, Estonian, Finnish, French, Greek, Hungarian, Icelandic, Italian, Latvian, Lithuanian, Dutch, Polish, Portuguese, Roumanian, Russian, Serbo-Croatian, Swedish, Czech and Turkish equivalents.

The glossary, which forms Part II of the compilation, is preceded by an Introductory Note and by a detailed description and explanation of the glossary and of how it should be used. Some guidance is here given on transliteration from Slav and other languages, and a table is reproduced to help readers to decipher and transliterate symbols derived from the Cyrillic alphabet into Latin characters. A full alphabetical index forms Part III of the work. Part IV contains tables showing the correspondence between the content of the headings in the Detailed International List of 1938—on which the glossary is based—and the Intermediate and Abridged Lists of that same year, and also the correspondence between the 1938 International Lists and the Detailed, Intermediate and Abridged Lists of 1929, to enable users to know what diseases are covered by the headings of all statistics based on the International Lists for the period 1931–1950.

The work reveals the need both for unifying the medical terms used in the different countries and for defining their meanings, and demonstrates that some form of international agreement on the nomenclature of disease is long overdue.

Dr. Biraud modestly apologises for any possible gaps and errors in this war-time glossary, explaining that circumstances did not allow of the sending of questionnaires to medical authorities of the various countries represented, or of submitting proofs to them for correction. The reviewer has noted only two errors, one in the Glossary, where Myiasis is entered under the heading 42(*i*) as a disease due to helminths, and the other in the Alphabetical Index where under the entries "Maladie des jeunes porchers," "Meningitis serosa porcinarii" and "Schweinehüterkrankheit" readers are referred to heading 38(*f*) in the Glossary but will find no corresponding entries at that place.

R. L. Sheppard.

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
By The South Essex Recorders, Ltd., Ilford.

(759) Wt. P9/279 9/44 S.E.R. Ltd. Gp. 432.

ALPHABETICAL LIST OF AUTHORS OR SOURCES.

Ahlm, C. E. & Lipshutz, J., 745.
Ardao, H. A. & Zerboni, E., 767.
Augustine, D. L., Weinman, D. & McAllister, J., 759.

Barretto, M. P., 732.
Bates, M., 749 *bis*.
—— & Weir, J. M., 747.
Bengtson, I. A., 738.
Bercovitz, Z., 787.
Berlin, C., 780.
Biggam, A. G., 782.
Biraud, Y., 790.
Bishop, A. & Gilchrist, B. M., 731.
Blank, H., 786.
Bomford, R. R., 730.
Boyd, J. S. K., 755.
Bühler, F., 742.
Buxton, P. A., 782.

Cameron, T. W. M., 761.
Carney, S. P. & Levin, N. B., 730.
Chesterman, C. C., 789.
Colas-Belcour, J. & Chorine, V., 758.
Colvin, S. H., Jr., Gore, I. & Peters, M., 774.
Costa, O. G., 737.
Culbertson, J. T. & Rose, H. M., 772.
——, —— & Demarest, C. R., 770, 771.

Davis, W. A., Juvera, F. M. & Lira, P. H., 744.
—— & Wheeler, C. M., 748.
Dennison, W. M. & Dick, A. L., 776.
Dixon, K. C., 723.
Drew, R., 782.

Earle, K. V., 768.
Edge, P. G., 727.

Finlayson, M. H., 776.
Freeborn, S. B., 729.
Funke, A., Bovet, D. & Montezin, G., 734.

Gear, J., de Meillon, B. & Davis, D. H. S., 739.
Giroud, P., Giroud, M. L. & Meunier, M., 788.
Graña, A., 764.
Gregory, J. R., 733.
Grindlay, J. H., 777.

Hamburger, H. J., 723.
Hawking, F., 782.
Heilman, F. R. & Herrell, W. E., 758.
Herrlich, A. & Liebmann, H., 782.
Holman, E. & Pierson, P., 762.

Ibarra Perez, R. & Gonzalez Prendes, M. A., 760.
Inter-American Co-operative Health Services, 722.

James, S. P., 782.
Jamieson, W. M., Brodie, J. & Stiven, D., 754.
Jaramillo, J. R., 746.
Jawetz, E. & Meyer, K. F., 759.
Johannessohn, F., 727.
Jones, H. E., Armstrong, T. G., Green, H. F. & Chadwick, V., 773.

Kark, S. L. & Le Riche, H., 775.
Kikuth, W., 724.
Kisner, P. & Lisansky, E. T., 751.

Ladell, W. S. S., 782.
Laemmert, H. W., Jr., 747.
Larsh, J. E., Jr., 764, 765.
Laurent, C., Barge, P., Berge, C., Audoye, H. & Fauconnier, J., 760.
Luis Carri, E., 737.

McArdle, B., 782.
McMahon, M. C., 753.
Menon, T. B., Ramamurti, B. & Sundarasiva Rao, D., 770.
Miller, M. M., Silverman, J. J. & Powell, V. E., 786.
Morton, T. C., 782.
Muraz, G., 784.

Noth, P. H. & Hirshfeld, J. W., 757.

Oldham, J. N. & White, E. G., 769.

Parrot, L. & Gougis, R., 736.
Patrick, F. L. L., 781.
Pessoa, S. B. & Barretto, M. P., 732.
Pirot, R. & Bourgain, M., 744.
Poth, E. J. & Ross, C. A., 757.
Potter, L., 782.
Pritchard, A. E. & Pratt, H. D., 722.

Rodger, L. M., 726.

Sachs, A., 782.
Sawyer, W. A., 787.
Scadding, J. G., 755.
Schilling, C., 723.
Scott, H. H., 782.
Scott, J. G., 733.
Scudi, J. V. & Hamlin, M. T., 728.
——, Jelinek, V. C. & Kuna, S., 728.
Seelig, S. F. & Hemming, J. R., 724.
Sen Gupta, P. C., 786 *bis*.
Sergent, E., 778.
Shipitsina, N. K., 719.
Shircore, J. O., 778.
Shukov-Vereshnikov, N. N., Kolodeznaja, Z. E., Zaletaev, S. G. & Ibrazimova, N. V., 741.
Simpson, T., 778.
Sivalingam, V., 718.
Stacey, R. S., 779.

Thuringer, J. M., 774.
Topping, N. H., 740.
Treu, R., 758.
Turner, R. H., Snavely, J. R., Grossman, E. B., Buchanan, R. N. & Foster, S. O., 750.

Waterlow, J., 782.
Watt, J. Y. C., 766.
White, R. S., 721.
——, Adhikari, A. K., Ramakrishna, V. & Roy, B. B., 720.
—— & Rao, V. V., 720.
Woblrab, R. & Patzer, G., 741.
Wolkin, J., Goodman, J. I. & Kelley, W. E., 785.

Young, G. B. & Macaden, C. J. A., 724.

Zeligs, M. A., Legant, O. & Webster, E. H., 752.

'Moogrol' BRAND

Ethyl Esters of Hydnocarpus Oil
(Stabilised with 4 % Creosote)

For the treatment of Leprosy

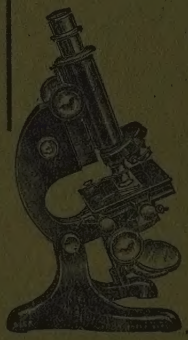
The addition of creosote to the ethyl esters of Hydnocarpus Oil prevents the formation of irritant oxidation products.

Specify
'Moogrol' with Creosote

BURROUGHS WELLCOME & CO.
(The Wellcome Foundation Ltd.)
LONDON

BECK MICROSCOPES

For over a century Beck Microscopes have been pre-eminent in design, workmanship and performance. In war conditions their aid to research, medicine and industry is essential.



R. & J. BECK Ltd.
69, Mortimer Street
LONDON, W.1

LIVERPOOL SCHOOL *of* TROPICAL MEDICINE
UNIVERSITY OF LIVERPOOL

COURSES OF INSTRUCTION

Arrangements have been made with the London School of Hygiene and Tropical Medicine and with the Colonial Office that, during the war, short courses of instruction in Tropical Medicine and Hygiene will be held alternately in London and Liverpool. The next courses for the Diplomas in Tropical Medicine and Tropical Hygiene will commence on a date to be announced later.

Prospectus from the Laboratory Secretary, School of Tropical Medicine, Pembroke Place, Liverpool, 3.

TREATMENT OF PATIENTS

There is an out-patient department at the School for all sufferers from diseases contracted in the tropics. Cases needing hospital treatment are admitted to the Tropical Ward (general and private wards) of the Liverpool Royal Infirmary, which adjoins the School. Special arrangements are made for Civil Servants, and for members of certain firms who are regular subscribers to the School.